THROUGH THE PRIZM OF TIME — ANGLES OF REFLECTION

Epilogue to "Comrade Einstein"

M. SHIFMAN*

> Ich wollt', meine Schmerzen ergössen
> Sich all' in ein einziges Wort,
> Gäb' ich den lustigen Winden,
> Die trügen es lustig fort.
>
> *Heinrich Heine*

> Каждый выбирает для себя
> Женщину, религию, дорогу,
> Дьяволу служить или пророку –
> Каждый выбирает для себя.
>
> *Юрий Левитанский*

After the manuscript of this book was sent to the Editorial Office of World Scientific in Singapore I have received quite a few comments from people who had the opportunity to read the draft version. Unfortunately, it is too late now to incorporate these comments in the book. Moreover, some of their authors made a reservation that their remarks are not for public distribution. However, I want to keep relevant excerpts in my records: to ignite a discussion, to show a spectrum of opinions and as an important evidence. I think that this selection nicely supplements the contents of the book and corrects a few inaccuracies which, unfortunately, slipped into the book.

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Boris Frenkin

Month DD, YYYY

Вина Шафаревича — абстрактно идеологическая, но, как мне кажется, административной вины нет. Если упоминать его, то обвинять квалифицированно и правильно, и в том, в чём он реально виноват. Вот цитата из книги И. Р. Шафаревича «Есть ли у России будущее», М.: Советский писатель, 1991, с. 536-537, (о представительстве разных национальностей в престижных сферах):

> *«С другой стороны, нужно сказать, какими средствами эти проблемы решались ещё недавно — например, в математике. О них, конечно, нужно сказать — они были чудовищные. Во время экзаменов происходила борьба, война с подростками, почти детьми. Им задавали бессмысленные или двусмысленные вопросы, сбивающие с толку. Это разрушающе действовало на психологию их и других подростков, которые видели, что поступающих для экзаменов делят на две группы. Когда они видели, например, что из одной аудитории выходят со сплошными двойками, а другая группа с четвёрками и пятёрками.*
>
> *Создавался класс таких экзаменаторов. Эти люди, конечно, были бы готовы и к другим действиям подобного рода».*

Комментарий: Все обвинения Шафаревича в антисемитизме, какие я видел, построены по принципу «Пастернака я не читал, но роман его осуждаю». Кто-то нашёл дешёвый способ проявиться как борец с антисемитизмом, а кто-то и стравливал людей, которые кому-то были бы опасны, если бы объединились. Сегодня приходится наблюдать, как осуждают «Русофобию» и при этом спокойно взирают, как «эти люди» (см. выше) продолжают занимать руководящие посты на мехмате и в других местах.

August 27, 2005

Dear Professor Shifman,

I have looked through ". . . Comrade Einstein" and the correspondence regarding this book, on your web sites. I suppose this book is very timely and useful in various aspects. I entered Mekh-mat in 1965 and did not encounter the problem of anti-Semitism at that time, but did later, and still more have I seen around. I suppose this was in most cases the problem of the bureaucratic system, not of somebody's personal position, and the same problem could have affected, in principle, any category of people (and did affect, sometimes). This fact makes your book still even more important.

A remark concerning related correspondence seems to be necessary. In my letter (in Russian) concerning Shafarevich's position, which I had sent to Kanel-Belov, the first two sentences are not due to me. Perhaps, they were attached during forwarding of my letter. They somewhat do not agree with the following

text. (I suppose there is no Shafarevich's "guilt" in bureaucratic anti-Semitism for a simple reason that he was considered — and actually was — an enemy of the system.)

So, I would like to ask you either to remove the first two sentences of my letter or to make a note that they were added in the course of letter's circulation.

Furthermore, since you posted this letter (sent by me to Kanel-Belov) on your site, perhaps, the following comment (sent by me to Kanel-Belov later) would be in order too: "... Во-вторых, и главное, основной вред в этих делах поисходит всё-таки не от идеологов-теоретиков, а от администраторов-практиков, чаще всего не антисемитов по убеждению, поскольку убеждений у них нет. И эти люди остаются за кадром, пока между собой разбираются носители разных идей. Кстати, действия бюрократии определяются вовсе не тем, что пишут идеологи, а собственным интересом. Вот что писал Витте о Плеве в своих мемуарах (изд. 1960 г., т. 2, стр. 35):

> «Он ... дабы показать, какой он „истинно русский и православный", готов был на всякие стеснительные меры по отношению ко всем подданым его величества неправославным. Вот почему Победоносцев его презирал, так как сам Победоносцев это делал по убеждению».

Как бы ни относиться к Победоносцевым, в реальности главную проблему составляют Плеве. Об этом я и хотел сказать."

Best regards,

Boris Frenkin

P. S.
I want to explain that I do not deny the role of ideology. But ideology is more important for the initiators than for "little guys" who just execute orders. And I suppose that most of Mekhmat "special examinators" were of this kind, be they assistant professors or professors. Of course, the order would not have been issued without the ideological background. But it could not have been implemented without such "little guys" who are not better (while much more numerous) than those who order the music.

Alexei Belov-Kanel

February 2, 2005

Perhaps, it is worth mentioning that in the last two years Mech-Mat hired 10 new faculty, and three of them are Jewish. Besides, it seems there is no more discrimination at the entrance examinations.

February 16, 2005

Поскольку важна точность выражений, я отвечаю по-русски.

Прошедшее есть история Советской и Российской математики, и мы должны знать историю. Для меня было важно выразить благодарность своим учителям и всем тем, кто мне тогда помог. Документы о Народном Университете имеют прежде всего человеческое измерение. Я готов и дальше собирать материалы.

Однако я против какой бы то ни было политики, белых книг и прочего. Если бы это было в конце 80-х – начале 90-х — это было бы правильно, подъём же вопросов через 20 лет после того, как всё закончилось, призывы к тем или иным действиям выглядят странно.

Кроме того, есть и другие аргументы. Роль Садовничего была велика в борьбе против призыва студентов в армию. Кроме того, вся математическая общественность (кроме отдельных выродков) сейчас борется против преступной школьной реформы. И любой конфликт чрезвычайно вреден. Сейчас, на мой взгляд, не время сведения счётов. В конце концов — почему не свели раньше? Почему вдруг сейчас?

Иное дело, если бы антисемитизм продолжался. Поведение должно зависеть от нынешнего отношения к евреям.

Как мне кажется, российская научная общественность придерживается той же точки зрения, что и я. Я могу ошибаться — но в любом случае надо понять общественное мнение.

Теперь о Шафаревиче. Он различал математические отношения (у него было много учеников евреев) и свою политическую философию (достаточно скверную). Антисемитизм на приёмных экзаменах, равно как и дискриминацию евреев, он никогда, насколько я слышал, не поддерживал. Если я не прав, и он упоминается в этом контексте — прошу указать случаи. Его общественная позиция по отношению к математике была такова — он позиционировал себя как чистого профессионала и вёл разговор как математик с математиком.

С уважением,

Алексей Канель

Andrei Reznikov

February 2, 2005

In your Foreword *you mention Shafarevich among ferocious anti-Semites. This is certainly true. However, before 1987 he seemingly never showed this in public. Moreover, at that time, after his anti-Marxist pamphlet appeared in* samizdat, *he did not have much power since he had problems with authorities. I do not think it is fair to put him in the same league with the main villains Vinogradov and Pontryagin, even though his views are appalling. I doubt he was involved in any anti-Jewish activities in the 1970s.*

February 12, 2005

After some thinking, I do not think it would be appropriate for me to defend Shafarevich. You can safely leave him in your foreword, as he deserves to be named. Let him himself defend his views. Surely, there will be defenders of Pontryagin and Vinogradov too.

February 16, 2005

My desire to collect materials about People's Jewish University and Bella Abramovna was driven solely by the wish to pay a small tribute to her and record some events of the past. Personally, I think that present problems of Russia are immediate results of the blank forgiveness unwisely and immorally exhibited by Russian intelligentsia in the 1990's, after the collapse of the Soviet State. But as you wrote, I prefer to hear about it from a distance or, better still, not at all.

By the way, Commander-in-Chief of the anti-Semitic campaign at Physics Department of Moscow University was Prof. Furtsev. He authored just one scientific paper in his entire career but was the Dean of Physics Department for many years. He was so prominent in this campaign that even Mekh-Mat's Dean Prof. Lupanov was no match to him.

Anatoly Vershik

February 3, 2005

In your Foreword *you mention Pontryagin. In 1978 I wrote, for a samizdat magazine* Summa, *a short review on the scandalous Pontryagin's* Autobiography, *published in an abridged form in* Russian Mathematical Surveys, *Volume 33, № 6 (1978). The full edition of* Biography of Lev Semenovich Pontryagin, Mathematician, Composed by Himself *is now available too (Prima B, Moscow, 1998). This Pontryagin's writing is remarkable: it is full of venom and animosity to many people who used to be his good friends and colleagues. Below is a quotation from my 1978 review.*

"Beginning in 1969 L. S. Pontryagin became notoriously known for his open

attack, together with I. M. Vinogradov and other comrades in arms, on all live mathematical forces of the country. This unprecedented pressure and persecutions go in all directions: dissertation defense, journal publications, selection of delegates to international conferences and congresses, editorial policies, translation of foreign books — all these regulatory mechanisms are concentrated in the hands of a small group of former mathematicians amongst whom L. S. Pontryagin is one of the leaders. Anti-Semitism of this group was exposed previously."

Judge on your own; look at just one sentence from the Biography of Lev Semenovich Pontryagin*:*

> *". . . Zionist circles carry out persistent attempts to present Einstein as the only creator of the theory of relativity. This is unfair."*

By the way, in 2002 I published the full Collection of our samizdat *magazine* Summa, *in the St. Petersburg Publishing House* Zvezda. *The above review is on page 204. This Collection contains other materials related to your book.*

G. K.

February 6, 2005

I am sure that publishing this book will have an effect of opening Pandora's box, and I wish that it could be published and widely distributed in Russia. . . . At the end of the article "Science and Totalitarianism" A. Vershik mentions the idea of making a White Book. As a first approximation, what do you think of the idea of setting up a website on the Internet asking the readers to send their stories, including the names of those involved in ethnic cleansing?

In the article by Kanevsky and Senderov the names of some young students who were dragged through all these humiliations are given. It may be a good idea to indicate (if possible) their present status and whereabouts.

In his article Shen writes that the Physics Department of the Moscow University in the 1980s was not exactly an exemplary department. Well, one could add here that one of the reasons for this ongoing failure was ethnic cleansing that had been successfully performed there already in the 1950s when Landau had been driven out (and, by the way, Fock, Leontovich, and Tamm were forced to quit too). They were later replaced by people like A. Logunov or Yu. Loskutov. "Achievements" of the former, as they are advertised on the Physics Department web site, include among other things "creation of a consistent relativistic theory of gravity which eliminates crucial difficulties of Einstein's general relativity." From the very same web site we learn that Prof. Yu. Loskutov managed to prove that black holes cannot be realized. As they say, no comments.

In Kanevsky and Senderov's and Shen's analyses of the entrance examinations to the Moscow University, MIFI and MFTI they emphasize the role of Olympiads. They missed an important detail which I could add based on my own experience. In those days, winners of the All-Union olympiads had crucial benefits at the entrance examinations. Well, to make it to the All-Union level

*for someone from the periphery he/she had to be among the winners of a Republican Olympiad. In my case, this was Moldavian Olympiad in physics. The unofficial rule was very simple: the winner **had** to be ethnic Moldavian.*

A few words about the entrance examinations. I finished a school in Kishinev in 1978 and thought about applying to Physics Department of the Moscow University. Luckily for me, I got advice from a friend of mine who was a few years older and had already experienced the examination procedure there, with its killer tricks. He explained to me (and later I had a chance to verify that he had been perfectly right) that the Moscow University and FizTech were alike as far as chances of being admitted are concerned. The main difference between the two institutions was that Jewish applicants would be given a "2" at one of the math exams at the Moscow University and thus knocked out in the beginning, whereas in FizTech they would let him or her pass all exams but would strike later, during the last session which had an intriguing name "interview." I tried to enter FizTech in 1978, and my score was quite high (5+4 for written and oral math, 4+4 for written and oral physics, and 4 for literary composition). Still, I was not admitted. The official explanation was that I did not pass the informal interview session.

This was my first experience as "Comrade Einstein." Later, the same repeated a few times: when I tried to get admission to the graduate school at Physics Department of the Moscow University, in my job searches, and so on. This is another story, though.

A. M.

February 13, 2005

I want to give you a good advice: just forget the whole story. Why are you concerned with events that happened long ago in the country to which, in fact, we did not belong? They hated us. We left. Period. The divorce was relatively civilized, not even close to what had happened in Germany. Shouldn't we be thankful?

A. Gorsky

March 4, 2005

Dear Misha,

I am in Paris now and Grisha gave me the new book on "Mech-mat" you edited. I have realized that a few months ago I spoke with a person referred to in your book as one of the executioners of the anti-Semitic policy in MGU. It was Maksimov — an old man, approximately 80 years old, with whom I discussed the fate of Petya Selivanov in his office. He is vice-rector now, responsible for educational process. During our conversation I said that they can not throw

out Petya from MGU even in spite of his mental disease, according to Russian laws. Surprisingly his eyes "nalilis krovyu" and he made a ten minutes remark starting with the words "There are no laws in Russia now since the country has been sold "zhidam".[1] I saw him for the first time in my life, and it was really terrible — he was completely out of control in these 10 minutes. It was a zoological anti-Semitism I have never seen before. So, some of these guys are still there.

Sergei Tabachnikov

March 9, 2005

Dear Misha,

Thank you for sending me the book ". . . Comrade Einstein." I received it today and cannot stop reading (some parts are familiar to me). My highest compliments for this work! Is it OK to promote the book? I have many friends and colleagues who will be interested.

I personally know many characters: e.g., in 1978-79, I helped Senderov to run an oral entrance exam preparation seminar at Moscow School № 2. I was then a fresh graduate of Pedagogical Institute; I failed MechMat's entrance exams in 1973. Among the members of my Jewish oral exam group, were some people who have managed to become successful mathematicians; probably the most famous of them is my high school classmate, Sasha Beilinson of University of Chicago. By the way, one of the 5 problems given to me at the oral exam was problem № 1 in Vardi's article.

I wonder whether you ever thought about creating some kind of depository for witness accounts (maybe, a web site). It does bother me that some of the "negative heroes" prosper in the West (I personally know two, one in France and one in the US). Seems to me, the community deserves to know the truth (and, for complete fairness, this could also provide these people a vehicle for repentance — if they wish to repent). Maybe, Sasha Shen would agree to be a mediator of such a web site. . .

March 10, 2005

Dear Misha,

I want to thank you separately for the epilogue. I do believe that the story should be widely known (although I also understand those who want to put all this behind them. . . but that's how some people think of Holocaust too). As I mentioned, my personal interest is explained by the fact that I was a victim too, and I personally know many people involved: Fuchs was my advisor and is a close friend of mine up to this day. I taught Belov when he was still called Kanel,

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[1] "To the jews" (*Russian derogatory slang*).

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at school № 2 when he was in the last grade, in 1979-80. I know Zelevinsky for more than 30 years, and Shen for about 30 years too.

Before leaving for the US in 1990, I was the head of the Mathematics Section of the Kvant *magazine. At some point, I got interested in what had happened in German mathematics under the Nazi, and in 1990 I wrote an article for* Kvant (`http://kvant.mccme.ru/au/tabachnikov_s.htm`)*. I mention this because the story of what had happened in Soviet Union is somewhat similar to the fate of German mathematics, albeit milder.*

I do think, one should establish a web site devoted to this issue. I will discuss it with A. Sossinsky, another teacher at People's Jewish University and my predecessor in Kvant, *who will be visiting here soon.*

Yuli Rudyak

March 14, 2005

Dear Misha,

My friend sent me a message regarding your book "You just failed you math test, Comrade Einstein."

I am glad that such book will appear. I have read a part of these materials in Russian, but, say, my colleague Alex Berkovich did not read them before and was very impressed with the book, especially with Part 3 on Bella Subbotovskaya.

A remark concerning the title. As you probably know, Albert Einstein actually failed the entrance exam in Eidgenossische Techinsche Hochschule, Zurich, and not because of anti-Semitism. Following the failing of the entrance exam to the ETH, Einstein attended a secondary school in Aarau planning to use this route to enter the ETH in Zurich.

In my opinion, this makes the title of your book a little bit vulnerable. But maybe I am wrong, please, consult other people.

A. T.

March 15, 2005

Dear Misha,

I fully support your efforts on making this book. I guess it is good that this book is not polished and not smooth. It is good it looks unfinished: the story is not over yet and will never be over.

I do not know why — in my life I met plenty of Jews who tried to "understand," forgive and finally forget. I still remember a horrifying book about pogroms in Germany in the medieval times, when our ancestors tried to ease pogromshchiks' task of cutting Jews' heads off. . .

Alexander A. Beilinson

March 15, 2005

Dear Misha,

I looked at the file of the book yesterday — my deepest thanks for it! I do not have any personal comments for I did not teach at the People's Jewish University. Just one remark: the book presents stories of people "from the top" — those who taught at the University. The voices of the (then) students are not here, which is a true pity. Also: together with Kanyevsky and Senderov, one of the students was arrested, adding considerably to the general feeling of anxiety and distress. As far as I remember, the story around his arrest is quite telling, saying much about the (larger circle of) people involved. A good account would add considerably to the picture.

Mark Sapir

March 15, 2005

Dear Misha,

Thank you for composing the book. I have read parts of it before and I knew some stories from the people mentioned in the book. But I am not sure that the book in its present form should be published.

The system does not exist any more. Although I was not admitted to MSU myself ("2" on the written exam), I do not want to get the "bad guys." After all, I am a Distinguished Professor in Vanderbilt, and they are in Moscow getting $200 per month.

The only really interesting parts of the book are about the alternative ("People's Jewish") university because these pages are about positive and "timeless" things. The parts about anti-Semitic discrimination are weak because the statistical material is very limited. Essentially, there are at most 5-10 people mentioned by names, and they are mentioned several times, so it looks like these are the only people discriminated against. In any case, it seems from the text that only about 100 were affected. To call what happened with these 100 people "genocide" is clearly a misstatement.

There was a similar situation in the leading US universities up to the 1950's. The materials on People's Jewish university are not complete either. It would be interesting to see a more complete list of people attending the university, how many of them became professional mathematicians, etc.

Classifying Pontryagin as an "anti-Semite" is not quite correct. He was clearly a sick person at the end of his life (it is enough to look at his autobiography). The problem was not in Pontryagin but in the general structure of the Soviet science which was based on "large schools," and what can be called "warlords" — the leaders of these schools. In this regard, "good" warlords were not much better than "bad" ones. Unlike Vinogradov and other bad guys mentioned

in the book (and many more unmentioned), Pontryagin was a **mathematician**; *he can be even considered a hero taking into account how much he contributed to math being completely blind.*

March 16, 2005

Dear Misha,

We are organizing a conference in honor of Bella Subbotovskaya. Perhaps, some additional information will come out at the conference. I think that your book played a positive role because it gave us the idea of the conference (I heard very little about Subbotovskaya before and did not even know that she had been Muchnik's wife.)

Let me point out another inaccuracy in the book: you write that no university in the USSR would admit Jews in the 1970s-80s. In fact, this was not the case: the Ural State University where I studied, admitted Jews, and so did Saratov University, and many others. In our class (the class that started in 1974) there were about 25 Jews out of 150 students, and the percentage of Jews admitted to our department was much higher than the percentage of Jews applied.

In the class of my sister (started in 1971, later she became a student of Muchnik), the number of Jews was even higher: about 35 out of 100. There was even a problem with their job assignments after graduation. The number of available jobs that did not require security clearance was smaller than the number of Jews in the class. So one Jewish guy was mistakenly assigned to a "secret" lab, and only when he reported to work they realized their mistake (just by looking at him) and told him that the job actually did not exist.

M. Shubin

March 29, 2005

Dear Misha,

Thank you very much for sending me the book "You failed your math test, Comrade Einstein." It is indeed a very good idea to publish such a book, and you did a great job collecting the contributions.

I have, however, a comment to your introduction. You stress a widespread character of mathematical schools and mathematical circles in Soviet Union.

You wrote: "Every city had at least one [mathematical school]. . . " "Even small towns tended to arrange a 'mathematical class' in a school."

This seems to me a huge exaggeration. There were mathematical schools in Moscow and Leningrad, of course, but not in smaller places. I went to school in Kuibyshev, not a small city (then it had about 800,000 population, about 1.3 millions now). There were never any mathematical schools there, and I would be very surprised if there is one now. Nobody ever cared. My mother tried hard to find something like a mathematical circle for me, but with no

success. Eventually, I found a good teacher, who was the (seemingly only) organizer of math olympiads, but he did not run a circle (saying me that there is no interest in mathematics in the school where he worked). In 1959 I got into the Kuibyshev region team for the first all-Russian math olympiad (it was kind of unofficial one, in 1960 there was already official "1-st All-Union Math Olympiad," where I was present too). In 1959 I was after 8th grade, came to Moscow for the first time, and was overwhelmed first by Moscow itself and second by the incredibly good mathematical circle in Moscow State University, which I visited. The participants were so good, that I felt that I am hopelessly behind them in math and will never be able to come even close to them. This impression strengthened next year, though my mother tried to calm me down saying, that even though I will not qualify to be a student in Moscow, I am good enough for Kuibyshev Polytechnic Institute (where she worked), and this will be even better for me. Happily I did not go to the Kuibyshev polytechnic, because in 1961 (when I graduated from high school at age 16), MSU moved entrance exams to July (from August), so I could safely try Moscow State without any risk. I made it (with all 5's in two mathematics exams, physics, foreign language and composition). Surprisingly, I caught up with those math circle participants in 1-2 years, and during 3rd year left almost all of them far behind.

Now I wonder: were these mathematical circles really important?

Anyway, my doubts about omnipresence of math circles are based not on my Kuibyshev memories only. I was always interested in them and went to different places (while being a student in MSU) to help organize local olimpiads. I can say that at least in those days a mathematical circle in province was a rare exception, and by no means a rule.

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Month DD, 2005

I have a second thought, though. I realized there is a reason why our data may have disagreed: yours refer to a later period.

When I was at school, and even when I was a MSU student eager to travel to provinces to help with math olympiads, the math schools were not there still. At that time probably, they were just in the making. Even in Moscow the famous schools № 2, 7, 57, as well as the Kolmogorov's internat, started later. (Maybe, Sputnik and the USA initiative in improving math education helped?) But I did not follow this development in the late 1960's. Obviously the picture you outlined in your Intro is time-dependent. We just sliced it at disjoint time intervals.

for neatness and uniformity, it would be nice to date this piece and drop the stars

E. Shuryak

April 5, 2005

Misha privet,

We all know science/math was allowed by Stalin to be exceptional, as he knew the country needed specialists at least then, and for a while.

After reading your text I spoke with some people from Novosibirsk , as well as a Moscow mathematician. They told that the effort aimed at "killing" Jewish applicants was well coordinated, and started simultaneously in various places. In the first year non-acceptance of Jews was invariably explained as some unlucky coincidence: e.g., "a secretary had forgotten to include his/her name in the list for a committee, and since the list was already approved by the Rector, it cannot be changed."

The fact that a campaign started in all best universities at the same time, as well as the frightening account of a truck at night accidentally chasing a lonely woman (in your book), tells me that it was all coordinated by KGB. They knew what they were doing, and now they have finally succeeded: there is nothing of any quality left there. A picture that hundreds of math professors suddenly had become active anti-Semites all over the country, out of their own convictions, is way too naive. In fact it needs an explanation.

The question is whether it is timely now to try to find out who actually did it. At what level was it decided? Note that exactly the same thing happened at Novosibirsk University, and probably many other places far from Moscow. So, it must have been a high enough level. . . Since many of these people are still in power, I am not so sure you really want to deal with them, or will be able to find out "who killed the Science/Math Movement. . . "

One thing is clear: Russia did not need all these smart Jewish fellows: so be it. To whom do we want to prove the opposite?

Muscovite

April 25, 2005

Да пошли они все на [х. . .]. От одного вида этих «патриотов» меня тошнит. Как сказал один известный московский острослов вчера у меня на вечеринке, «. . . Жизнь даётся человеку один раз, и прожить её надо таМ, чтобы не было мучительно больно за бесцельно проПитые годы. . . »

Marek Karliner

April 28, 2005

Dear Misha,

Have you seen this document? Doesn't it complement nicely your book? It is tragicomical to see how such issues were decided in the Soviet Union.

$\star\ \star\ \star\ \star\ \star$

ДОКУМЕНТ 45

<div align="right">

Сов. секретно
Экз. единственый
Рабочая запись

</div>

<div align="center">

ЗАСЕДАНИЕ ПОЛИТБЮРО ЦК КПСС

20 марта 1973 года

К вопросу о выезде за границу лиц еврейской национальности

</div>

БРЕЖНЕВ. Когда читаешь материалы, а я их читаю все, то видишь, что всё-таки создался серьёзный тормоз в ходе завершения официального визита в США по причине сионизма. В последние месяцы разгорелась истерия вокруг так называемого образовательного налога на лиц, выезжающих за границу. Я много думал, как быть. На прошлом заседании Политбюро мы не записывали этого, но условились, что т. Андропов примет соответствующие меры. Я тогда не знал, что это дело т. Щёлокова, и отдел у них, оказывается, такой есть. Я сказал тогда: «Приостановить взимание налогов, то есть, не отменяя закона, отпустить партию человек в 500 евреев, которые никакого отношения ни к секретности работы, ни к партийным учреждениям не имеют. Даже если попадутся и лица среднего возраста, например, из Биробиджана, отпустить. Они расскажут, и все будут знать об этом». Но стал я проверять, душа моя беспокойная, думаю, дай спрошу т. Щёлокова. Звоню ему, а он говорит: «Я в первый раз слышу». «Как первый раз слышишь?» Значит, он ничего не знает об этом. Он не виноват, он не был на Политбюро. Звоню Юрию Владимировичу:[1] «Как же так?» Юрий Владимирович говорит: «Я разговаривал с его замом». Значит, заместитель не передал ему. Звоню т. Громыко, прошу проверить по консульствам. Говорю ему, что не знаю, что консульства оформляют выезды. Оказывается ничего подобного. До сих пор взимают плату. В 1973 году отправлено 349 человек, с которых взыскано полтора миллиона рублей. У меня справка есть об этом.

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[1] Имеется ввиду Ю. В. Андропов.

АНДРОПОВ. Это до Вашего указания.

БРЕЖНЕВ. Мы об этом говорим уже с прошлого года. Указания не выполняются. Меня это беспокоит. Я не ставлю вопроса об отмене закона, а если хотите, и этот вопрос можно бы поставить. То ли мы будем зарабатывать деньги на этом деле, то ли проводить намеченную политику в отношении США. Учитывая конституционные статьи, Джексон успел внести поправку ещё до внесения Никсоном законопроекта о предоставлении нам режима наибольшего благоприятствования.[1] Эту поправку внёс сенатор, и Конгресс уже не может отказать в обсуждении этой поправки. Джексон уже опередил. Вот я и думаю: что тогда стоит наша работа, что стоят наши усилия, если так оборачивается дело. Ничего!

АНДРОПОВ. Разрешите. За последнее Ваше указание, которое было дано на прошлом Политбюро, я несу ответственность. По моей вине мы задержали на шесть дней (просто это неповоротливость нашего аппарата) исполнение Вашего указания. В субботу Вы мне позвонили, в субботу мы связались с т. Щёлоковым.

БРЕЖНЕВ. Никто, Юрий Владимирович, не давал Вам права писать письмо. Но если какой-то юрист или консульство не выполняет своей миссии, так замените его. Мы дали т. Добрынину резервную позицию, он держит её в кармане, пока из Москвы не получит согласия. Перед отъездом т. Добрынина мы с т. Гречко беседовали с ним и инструктировали по этапам: какие возможные варианты указаний он будет получать по мере согласования вопросов с Политбюро. Шёл разговор и о том, как выпустить из кармана еврейский вопрос. Мы проявляем заботу, а что из этого получается? Ничего.

АНДРОПОВ. На пять дней, повторяю, мы задержали.

БРЕЖНЕВ. В субботу, в воскресенье я на воздух не выходил, а ещё приходится заниматься этим вопросом.

АНДРОПОВ. Леонид Ильич, в субботу Вы позвонили, в субботу пошло указание по этому вопросу, фактически с субботы действует, и сегодня «Свободная Европа» и «Би-Би-Си» объявили, что евреи отъезжают без взимания налога...

Но я хочу всё-таки привести такую справку относительно этих 300 человек. Было Ваше указание в ноябре и декабре: выпустить, и мы выпустили без взимания налога 600 человек и ещё раз 600 человек. А потом — закон действует, и мы действуем. Я должен сказать, что 75 процентов уезжающих вообще ничего не платят, и только 13 процентов составляют люди, которые платят. Начиная с понедельника не взимаем платы.

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[1] Имеется ввиду поправка Джексона-Вэника к Закону о реформе торговли ("Trade Reform Act") 1974 года, принятая Конгрессом США, согласно которой запрещалось предоставление Советскому Союзу и странам Восточной Европы (за исключением Польши и Югославии) статуса наибольшего благоприятствования в торговле, государственных кредитов, а также государственных гарантий на кредиты и частные инвестиции. См.: U.S. Congress, Senate, Senator Henry M. Jackson of Washington Speaking for the Amendment of the Trade Reform Act of 1974, Amendment № 2000, 93d Cong. 2d. Sess., December 13, 1974, Congressional Record 120:174.

БРЕЖНЕВ. Юрий Владимирович, извините, вот справка. Я её читаю:

«В 1972 году из 29 тысяч 816 человек лиц еверйской национальности, выехавших из СССР, 912 человек, имеющих высшее образование, в соответствии с Указом Президиума Верховного Совета СССР, возместили затраты в сумме 4 миллиона 427 тысяч рублей».

Это за 1972 год.

За два месяца 1973 года уехало 3318 человек, из них 393 человека, имеющих образование, заплатили 1 миллион 561 тысячу 375 рублей. Вот что стоят наши общие разговоры. Поэтому сионисты воют, Джексон на это опирается, а Киссинджер приходит к Добрынину и говорит, что мы понимаем, что это внутреннее дело, мы не можем вмешиваться, у нас тоже законы есть. В то же время он говорит: помогите как-нибудь, Никсон не может пробить законопроект, он работает среди сенаторов. Зачем нам нужен этот миллион?

АНДРОПОВ. Я получил это указание через т. Суслова в ноябре, было сказано, что это в разовом порядке. В разовом порядке мы это и сделали, Леонид Ильич. Затем закон вступил в силу. Я ещё раз говорю, 10-11 процентов от числа отъезжающих платят.

Леонид Ильич, я хочу попросить Вас взвесить и другой вопрос. Вот сидит т. Громыко, он знает: англичане в своё время внесли в ЮНЕСКО предложение о предотвращении утечки мозгов. Мы сейчас выпускаем и стариков, и детей, и взрослых. Едут врачи, инженеры и т. д. Начинают и от академиков поступать заявления. Я Вам представил список.

БРЕЖНЕВ. Юрий Владимирович и Николай Анисимович,[1] никаких академиков, а из этих 39 тысяч заявок вы отберите 500 человек и отправьте их.

КОСЫГИН. Если едут у вас академики, я не слышал, чтобы какие-то академики уезжали. Оттого, что он заплатил 500 рублей, что он, не академик стал, что ли?

БРЕЖНЕВ. Закон не надо отменять. Мы условились не менять закона. Но на данном этапе, когда сионисты разожгли кампанию вокруг поправки Джексона и вокруг Законопроекта о представлении нам режима, надо отпускать. Дело не в режиме, им надо вообще поссорить Советский Союз с Америкой. Есть группа республиканцев, которая поставила целью сорвать улучшение отношений Советского Союза с США. Никсон – за, администрация – за, а многие сенаторы против только из-за того, что у нас с евреев взимают плату.

«улучшения» изменено на «улучшение»

КОСЫГИН. А кого мы не хотим выпускать, мы не должны выпускать.

АНДРОПОВ. Вот недавно поступил на имя Леонида Ильича документ.

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[1] Имеется ввиду Н. А. Щёлоков. Он не был членом Политбюро, но существовала практика приглашения министров на Политбюро для участия в обсуждении вопросов, касавшихся их ведомств.

БРЕЖНЕВ. Я прочёл твою записку т. Марше.[1] Я с тобой согласен.

АНДРОПОВ. С понедельника едут не 600 человек, а полторы тысячи.

БРЕЖНЕВ. Отпусти 500 второстепенных лиц, а не академиков. Пусть они говорят, что с них ничего не взяли. Возьмите пару инженеров с высшим образованием, не имеющих никакого отношения к секретам, например из пищевой промышленности, — пусть едут. Но не с оборонной промышленности. Пускай и инженеры едут бесплатно. Это временный тактический манёвр.

ЩЁЛОКОВ. Леонид Ильич, так мы поступаем с понедельника, отобрали людей с высшим образованием, которых можно отпустить...

Леонид Ильич, я ещё хотел сказать, что, может быть, в связи с тем, что опубликованы данные о желающих возвратиться, использовать их здесь для пропаганды по телевидению, в печати и т. д.

АНДРОПОВ. Было такое поручение, вчера мы получили телеграмму, 10 семей мы возвращаем.

КОСЫГИН. Наш народ очень плохо реагирует на возвращение. Говорят, раз уехали, то их обратно не принимать.

БРЕЖНЕВ. Найти другие средства информации, не показывать людям, это вызывает негативную реакцию. Можно сообщить доверительно Никсону, что бегут из Израиля. На заграницу можно вещать. Ни у кого сомнений нет, товарищи?..

Я задал себе вопрос: существует издавна у нас еврейский журнал, который издаётся в Москве.

КОСЫГИН. На русском языке?

БРЕЖНЕВ. Нет, на еврейском. Редактор — еврей Арон Вергелис, язык — еврейский. Я узнал это из информации, что этот редактор ездил в Америку, он честно написал, как его обрабатывали, как его повёз на дачу один старый друг. А когда приехал, увидел там шабаш еврейский. Ах, Арон приехал. А этот Арон взял да и выдал всё в нашу пользу и написал записку. Я впервые узнал, что есть такой журнал.

Я тогда задал вопрос: есть у нас сколько-то цыган, но разве больше, чем евреев? Или у нас есть закон, преследующий евреев? А почему бы не дать им маленький театрик на 500 мест, эстрадный еврейский, который работает под нашей цензурой, и репертуар под нашим надзором. Пусть тётя Соня поёт там еврейские свадебные песни. Я не предлагаю этого, я просто говорю. А что если открыть школу? Наши дети даже в Англии учатся. Сын Мжаванадзе воспитывается в Англии. Моя внучка окончила так называемую английскую школу. Язык как язык, а остальное всё по общей программе. Я так рассуждаю: открыли в Москве одну школу, называется еврейская. программа вся та же, как и в других школах. Но в ней национальный язык, еврейский, преподаётся. Что от этого изменится? А ведь их всё-таки три с половиной миллиона, в то время как цыган, может быть, 150 тысяч.

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[1] Речь идёт о письме Генерального секретаря французской компартии Ж. Марше, в котором он говорил об отрицательном политическом резонансе политики КПСС по вопросу о выезде евреев из СССР.

Я эту дерзкую мысль задал сам себе. Но так как я всегда полон откровения, то я думаю: «Никто ни разу не предложил, а что если разрешить еврейскую еженедельную газету?» У нас раз в неделю маленькие газеты выходят в Биробиджане. Не все её прочтут на еврейском. Прочтёт еврей, старый Абрамович прочтёт, а там-то, что ТАСС передаёт.

У нас вся политика по еврейскому вопросу основывается на одном Дымшице, вот видите, у нас т. Дымшиц зам. пред. Совмина, так что зря говорите, что евреев притесняем. А может быть, нам немножко мозгами пошевелить?

Я это говорю свободно потому, что я ещё не поднял руки за то, что говорю. Я просто пока — руки по швам и рассуждаю, вот в чём дело.

КОСЫГИН. Конечно, надо подумать, потому что мы сами себе придумываем еврейский вопрос.

БРЕЖНЕВ. Сионизм нас глупит, а мы деньги берём со старухи, которая получила образование. Раз у неё высшее образование — плати деньги Щёлокову. Он тебе даст бумажку, тогда ты поедешь в Израиль. Вот такова политика. Я, конечно, не забываю при этом, что отпускать не только академиков, но и специалистов среднего звена не следует, не хочу ссориться с арабами. Мы просим вас в этом месяце отпустить одну партию 100 чел., затем вторую — 100 чел., третью — 100 чел. и не брать с них налогов, включить несколько второстепенных специалистов — вот о чём идёт речь.

Вы извините, что я так темпераментно говорю. Но я говорю потому, что Политбюро было такого мнения, а практических решений нет.

Товарищи понимают это в принципе?

ВСЕ: правильно.

БРЕЖНЕВ. У нас не один ум, а 25 умов.[1] А там один придумал и решил. Как поступают капиталисты? Если ты поступаешь в колледж, получаешь образование за пять лет или за четыре, оно стоит 40 тысяч долларов. Раз ты получаешь высшее образование, то обязан 40 тысяч долларов вернуть. После этого ты имеешь право свободной поездки в любую страну мира. Таково положение в Израиле. У нас сейчас поступают так: если гражданин кончил, например, пищевой институт, проработал 40 лет, а ему уже 60 лет. И вдруг вспомнили, что он 40 лет назад кончил институт, теперь же он в Израиль хочет ехать. Ему говорят: «Плати 5800 рублей, тогда поедешь». Но ведь это совсем разные вещи. Так что одно дело дать стипендию человеку, и он должен её отработать, а другое — плата за полученное образование.

КОСЫГИН. Давайте примем предложения.

БРЕЖНЕВ. Не надо давать письменных указаний, надо вызвать работников и сказать им. Причём это не каждый может понять, могут разболтать, что это такие тактические шаги. Хорошо, кончили с этим. Скажу об одном случае. Как-то приехал ко мне Антон Гаевой в Днепропетровск.[2] Бы-

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[1] Видимо, имеется ввиду приблизительное количество членов Политбюро (включая кандидатов и секретарей ЦК). Во время заседания 20.3.1973 Политбюро вместе с Секретариатом ЦК составляло 26 человек.

[2] Л. И. Брежнев был первым секретарём Днепропетровского обкома в период с 1946 по 1950 годы.

ло воскресенье. Я говорю: «Знаешь что, Антон, давай сходим куда-нибудь». В это время открывалась филармония, как раз 200 метров от нашего дома. Я говорю ему: «В филармонию какая-то певичка Соня приехала». Я даже не понял, что фамилия у неё еврейская. На концерте оказалось 100 процентов евреев. Только антон Гаевой и я с супругами оказались среди них. А эта Соня пела еврейские старинные и свадебные песни. Только песенку споёт, а зал кричит: «Браво, Соня!» Если открыть еврейский театр, то он будет бездотационный и будет приносить прибыль в бюджет.

КОСЫГИН. Тогда я запишу в доход.

БРЕЖНЕВ. Ты можешь запланировать миллион, они тебе дадут миллион, хотя они его и не заработают.[1]

$\star\ \star\ \star\ \star\ \star$

Marek Karliner

May 2, 2005

Dear Misha,

This document is very unlikely to be a forgery. It comes from a collection of high-level Soviet documents «Еврейская эмиграция в свете новых документов» published in 1998 by a reputable researcher working at the Sovietology Center of the Tel Aviv University, namely Dr. Boris Morozov. For more details about the author see

`http://www.tau.ac.il/~russia/cvs/Research%20fellows/morozov.html` .

The author had an officially-sanctioned access to top-level post-Soviet archive called «Центр Хранения Современной Документации». The book is a part of a wider "Agmon Project" dealing with Jewish emigration from the USSR after the WWII, see

`http://www.tau.ac.il/~russia/projects/agmonprj.html` .

The scientific committee of this project consists of four very senior and very well-known Israeli historians. This book contains 75 documents dated between 1957 and 1989.

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[1] Текст документа печатается по публикации в журнале «Новое время», 1996, № 9, стр. 42-44.

Month DD, 2005

To double-check, I asked the editor:

> *"Dear Dr. Morozov,*
>
> *A footnote says that the text of this document is based on publication in Novoye Vremya. This is different from most documents in the book, where you had access to the official protocols.*
> *Has it been possible to verify that the text published by Novoe Vremia is accurate?*
>
> *Thanks and best regards,*
>
> *Marek Karliner"*

His answer is below.

> *"Dear Dr. Karliner,*
>
> *Yes, the text is 100% OK. It is referenced to Novoye Vremya because it is from the President's archive and is not declassified, so I had to use them in order to publish it.*
>
> *Yours,*
>
> *Boris Morozov."*

Youri Schwartz

June 9, 2005

Dear Mr. Shifman

We are sorry for the substantial delay in answering your letter.
Mainly, it has been caused by the loss (due to force-majeure circumstances) of our magazine's archives.
After having studied the article authored by a well-known historian Mr. L. Bezymenski, that has drawn your kind attention ("NT" № 9, 1996), we are pleased to inform you that the Editorial Board has no doubts whatsoever about the authenticity of the documents mentioned in the article in question.
We appologise once again for the delay in answering you.

With kind regards,

Yours sincerely,

Youri Schwartz

June 9, 2005

for neatness and uniformity, it would be nice to date this piece (I dropped the stars)

Michael Entov

May 3, 2005

In connection with the recent developments we are trying to organize a conference "Different approaches to complexity in mathematics and mathematical physics" at Technion – Israel Institute of Technology (Haifa, Israel), in memory of Bella Subbotovskaya.

The conference is to take place some time between December 2006 and June 2007 – the exact dates are to be determined later.[1] Would you be interested in coming to Technion for the conference?

Alexander Shen

May 5, 2005

There is one thing which I feel I should mention — in your Preface it is written that prominent mathematicians Vinogradov, Pontryagin, and Shafarevich were ferociously antisemitic and had a lot of administrative powers. As to antisemitism, it seems to be an oversimplification of a very complex situation (e.g., Pontryagin helped Rochlin a lot, protecting him in very difficult times; Shafarevich's writings in «Из под глыб» are, in my opinion, very interesting and deep and do not deserve this label, etc.). As to administrative powers, this is true with regards to Vinogradov and Pontryagin, but completely false for Shafarevich: he was expelled from the Moscow State University as a dissident just before the discrimination of Jews started! I think it is not fair to combine all of them in such a general statement...

Ilan Vardi

May 11, 2005

Dear Misha,

Hi, I just got your mail with the responses from Russian mathematicians. I must say that it surprised me a little, but in the end, I found it completely consistent with the conclusions I came up with, the ones published in the book. In particular, not one single person mentioned anything about the mathematical content (at least in English) not even the fact that the "Intellectual Genocide" paper mostly makes wrong mathematical assertions (no wonder they went unnoticed for 24 years).

As I said, this is consistent with the phenomenon of mathematicians losing their sense of correctness when dealing with political issues, and the general loss of any mathematical awareness on all sides when it comes to these killer

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[1] The conference took place June 12-19, 2007. For details, see page 45 or refer to
www.math.technion.ac.il/cms/2006-2007/Different-Approaches/announcement.htm

problems. In particular, I cite Mark Sapir (whom I know to be interested in elementary math puzzles): "The only really interesting parts of the book are about the alternative university because these pages are positive and 'timeless' things." Apparently, he didn't feel that any of the mathematical results were 'timeless' indicating that the only thing you can expect from parties involved is total mathematical blindness. I also see that my original frustration with Shen, that is, his inability to make a precise statement of fact, is completely typical behaviour.

In any case, this definitely confirms me as the only possible person to actually do the work I did. I now find myself quite surprised (pleasantly so) that you were actually interested in my efforts to find the mathematical truth behind the problems, including my critique of "Intellectual Genocide."

Maybe there will be a different reaction from non Russians.

Best regards,

Ilan

May 12, 2005

In my opinion, the number of mathematicians in the world is constant, that is, a very small number, and the majority are just smart people who got into this career because it is possible these days (a hundred years ago, they would have been craftsmen). One good test is whether you can keep your focus despite adversity. I should know, I have been in as hard a situation as the folks still in Russia. As Sapir points out, the ones now in the US are living very comfortably.

Alex Kogan

May 27 & 28, 2005

only one comment by Kogan; why two dates?

Dear Misha,

*Many thanks for your effort. It did bring back some bad old memories (I am one of those few Jews who did succeed in getting into Phystech in 1978). But it is critical to document what had happened. By the way, Phystech was much more mechanical and efficient than Mekh-mat in separating out and failing the Jewish applicants. I also believe that names **should** be mentioned — not for the sake of retaliation, but for the sake of future generations. This is the only way to let possible future perpetrators know that the truth does eventually come out.*

I am Professor of Information Systems in the Rutgers University Business School — see `kogan.rutgers.edu`*. I know Ilya Muchnik pretty well.*

I think not only me but a lot of people of my generation (and our parents!) will be very grateful to you for this work. There is of course another part of the story which is more difficult to argue — the admission to the doctoral

courses (aspirantura): after I graduated from Phystech with straight 5's, our party committee had the chutzpa to stop me from applying to the Phystech aspirantura. I did survive, though, and got admitted in the aspirantura of the Computer Center of the USSR Academy.

By the way, you thank Misha Vyalyi in your preface. He was my room-mate for seven(!) years. He is not Jewish, but as a really-really decent guy he was absolutely disgusted by what was happening with me and the others (we got to know each other first in the 9-th grade, and became friends and team-mates at the Ukrainian and All-Union Mathematics Olympiads.)

Very best,

Sasha

Episode in Trieste

May 27, 2005

Из частной беседы с Вадимом Кузьминым и его подружкой, дочерью авиа-конструктора Миля, в кафетерии ICTP, в Триесте, 27 мая 2005 года:

Ничего этого не было. Если и была дискриминация, то самую малость. Так, по мелочам... Сами виноваты, надо было записываться русскими.

Yuri Dreizin

June 20, 2005

Dear Misha,

I should thank you for the book on "intellectual genocide" you gave me. I knew Valery Senderov and Boris Kanevsky very well since the time we were active members of an unofficial freshmen seminar on nontrivial problems in elementary mathematics led by Anatoly Pavlovich Savin. I believe Savin was in charge of selecting math problems for the All-Union Math Olympiads organized by Fyztech. I lost close contact with Valery and Boris later: in the 1970s I was already with the Kurchatov Institute closely monitored by KGB, and, understandably, did not want to be associated with dissidents.

Much later (around 1986), I got involved in a story of the type described in your book. I thought I could try defend, without too much risk for myself, a mathematically talented Jewish girl from Novosibirsk (her name was Anya, she was the daughter of Grigory Surdutovich) who was flunked at the entrance examination at Mekhmat.

I gave her a few brush-up lessons before the examinations, and when she told me how she was deliberately flunked, I believed her completely. I went on her behalf to Sadovnichii, then Prorector of the Moscow University and the Head of the Admission Committee. I had a short (less than 10 min.) conversation with

him. I tried to expose the unfairness of the exam, and saw, with my own eyes and very clearly that, while he wanted to be perceived as neutral and objective, he understood damn well what was going on. Sadovnichii just covered it up the best way he could.

By the way, that girl, Anya, the daughter of Grigory Surdutovich whom you met in my house, later was admitted to "kerosinka." But the injustice done to her at Moscow University broke her life, literally. She never recovered.

Your book revived memories of this nearly forgotten chapter of my life, and brought it to a closure.

D. I. K.

August 15, 2005

A miracle happened, I got "5" on written math. On oral they gave me about 10 problems, in a quick succession, which I dealt with more or less OK. I do not remember them now, only the last one, which, they said, was trivial:

$$f(f(x)) = x^2 - 2\,.$$

I could not solve this equation, although I managed to prove that a solution existed. This was the end of my Mekhmat story, as I got "2," and later decided not to waste my time next year. Somebody told me recently that Feynman used to suggest this functional equation to his prospective postdocs to try their skills. I do not know whether or not this is true.

Ilan Vardi

August 21, 2005

Hello, Misha,

here is a message I just received. I thought you might be interested in the new historical information Vadim Suvorov has about other MGU departments.

Best regards,

Ilan Vardi

Vadim Suvorov

`stelary@gmail.com`

August 20, 2005

Dear Mr. Vardi,

Being myself in the past one of potential targets (although not a victim) of "political math," I was surprised by and enjoyed reading your article on killer problems ("Mekh-mat entrance examination problems"). I would like to offer my solutions to some of the problems.

<u>Problem № 6</u>

$$(1/\sin^2 x) \leq (1/x^2) + 1 - 4/\pi^2 \text{ for } 0 < x < \pi/2 \leftrightarrow$$

$$(1/\sin^2 x) - 1 \leq (1/x^2) - 4/\pi^2 \leftrightarrow$$

$$(\cos x/\sin x)^2 \leq (1/x^2) - 4/\pi^2 \leftrightarrow$$

$$(x\cos x/\sin x)^2 \leq 1 - 4x^2/\pi^2 \,. \tag{1}$$

Thus, the first line is equivalent to the last. The proof of the last line splits in two parts. We will prove both sides of the inequality

$$(x\cos x/\sin x)^2 \leq \cos x \leq 1 - 4x^2/\pi^2 \tag{2}$$

separately. I will start from the second inequality,

$$\cos x \leq 1 - 4x^2/\pi^2 \leftrightarrow$$

$$4x^2/\pi^2 \leq 1 - \cos x \leftrightarrow$$

$$4x^2/\pi^2 \leq 2[\sin(x/2)]^2 \leftrightarrow$$

$$2x/\pi \leq \sqrt{2}\sin(x/2) \,. \tag{3}$$

The last line is a valid inequality because $2x/\pi$ is a chord connecting the endpoints of the convex function $\sqrt{2}\sin(x/2)$ for $x = 0$ and $\pi/2$.

Now, I comment on the first inequality in Eq. (2),

$$(x\cos x/\sin x)^2 \le \cos x \leftrightarrow$$

$$(x\cos x/\sin x)\,\frac{x}{\tan x} \le \cos x \leftrightarrow$$

$$x/\sin x \le (\tan x)/x\,. \tag{4}$$

Generally speaking, this is a well-known fact. Its proof would be required, however, during an exam like you described. Therefore,

$$x/\sin x \le \tan x/x \leftrightarrow$$

$$x^2\cos x \le \sin^2 x \leftrightarrow$$

$$x\cos^{1/2} x \le \sin x\,. \tag{5}$$

Let us consider $f(x) = \sin x - x\cos^{1/2} x$ on the interval $0 \le x < \pi/2$. Then, $f(0) = f'(0) = f''(0) = 0$, and

$$f''(x) = \sin x(\cos^{-1/2} x - 1) + x(1 + \cos^2 x)/(4\cos^{3/2} x)\,,$$

which is obviously positive on the above interval. Therefore, $f'(x)$ grows from 0 and is also positive, and, consequently, $f(x)$ is positive, which completes the proof.

Problem № 12

$$y(x + y)^2 = 9\,,$$

$$y(x^3 - y^3) = 7\,. \tag{6}$$

From the first equation we have $y > 0$, then from second $x > 0$. Let $z = \sqrt{y}$. Then,

$$y(x + y)^2 = 9 \leftrightarrow$$

$$z(z^2 + x) = 3 \leftrightarrow$$

$$x = 3/z - z^2\,. \tag{7}$$

Substituting x and y in the second equation we have

$$z^2((3/z - z^2)^3 - z^6) = 7 \leftrightarrow$$

$$z^9 - (3 - z^3)^3 + 7z = 0\,. \tag{8}$$

Let us consider

$$f(z) = z^9 - (\lambda - z^3)^3 + 7z = 2z^9 - 3\lambda z^6 + 3\lambda^2 z^3 + 7z - \lambda^3$$

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for $\lambda > 0$. Then

$$f'(0) = 18z^8 - 18\lambda z^5 + 9\lambda^2 z^2 + 7\,,$$

$$f''(z) = 144z^7 - 90\lambda z^4 + 18\lambda^2 z = 18z(8z^6 - 5\lambda z^3 + \lambda^2)\,. \qquad (9)$$

The discriminant of the expression in the parentheses is negative, and, therefore, $f''(z) > 0$ for all $z > 0$. Next,

$$f'(0) > 0, \quad f''(z) > 0, \quad \text{therefore,} \quad f'(z) > 0 \quad \text{for all} \quad z > 0\,;$$

$$f(0) < 0, \quad f(+\infty) > 0, \quad f'(z) > 0\,, \qquad (10)$$

therefore, there exist the only solution for z such that $f(z) = 0$. For $\lambda = 3$ we can guess $z = 1$. Hence,

$$z = 1 \rightarrow y = 1, \quad x = 2$$

is the only solution.

Problem № 8

$$(a - d)^2 + (b - c)^2 \geq 1.6$$

$$\text{for} \quad a^2 + 4b^2 = 4, \quad cd = 4. \qquad (11)$$

I was looking for a curve separating the hyperbola and the ellipse. Only after considering ellipse, hyperbola, and various exotic (and computationally difficult) curves I realized that a line will do. Indeed, let us consider a tangent to the ellipse at the point (a, b). Its equation is

$$x + 4by - 4 = 0.$$

For arbitrary (x, y) the signed distance to the tangent

$$\text{dist}(x, y) = (ax + 4by - 4)/\sqrt{(a^2 + 16b^2)}.$$

Therefore, for the hyperbola points

$$\text{dist}(d, c) = (ad + 4bc - 4)/\sqrt{(a^2 + 16b^2)} \geq (2\sqrt{(4adbc)} - 4)/\sqrt{(a^2 + 16b^2)}$$

(Cauchy's inequality). Then,

$$\text{dist}(d, c) \geq (2\sqrt{(4abcd)} - 4)/\sqrt{(a^2 + 16b^2)} = (8\sqrt{(ab)} - 4)/\sqrt{(a^2 + 16b^2)}.$$

For all point of the ellipse the $\text{dist}(a, b) \leq 0$ (because the line is the tangent of a convex function). Therefore, the distance between the ellipse and the hyperbola

$$\text{dist} \geq (8\sqrt{(ab)} - 4)/\sqrt{(a^2 + 16b^2)}\,.$$

Selecting $a = \sqrt{2}$, and $b = 1/\sqrt{2}$, we have dist$\geq 4/\sqrt{10}$, and, therefore, $\text{dist}^2 \geq 8/5$, q. e. d.

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(Why this particular point? I guess, because it corresponds to $\pi/4$ in polar coordinates. It also helps to write the result as a decimal fraction, to trick the problem-solver into thinking that it is not exact.) Another interesting result can be obtained using $a = 8/5$, and $b = 3/5$ (from $4^2 + 3^2 = 5^2$). Then

$$\text{dist}^2 \geq (121 - 40\sqrt{6})/13 \approx 1.7708,$$

which is a very close approximation to the exact minimum. During the exam, however, one would have to prove that $(121 - 40\sqrt{6})/13 \geq 8/5$. Calculator would not be accepted as a proof. (Not difficult, but annoying anyway.)

Another problem

The following problem was attributed by folklore to a similar exam at the time of my graduation (1980). Unfortunately time wiped out even those details I knew about it. What remains is the problem itself, and the answer (negative): Is there a point inside the unit square (a square with the side length 1) for which the distances to all four vertices are rational numbers?

An interesting observation is that tricks were expected in these problems. It never helped, but formally one could request during appeal (after failed exam) to demonstrate a solution which does not go beyond school graduate knowledge. So, such a solution was always prepared by problems' authors. Nobody asked, however, how long did it take them to come up with the solution.

The configuration problems in geometry (when the conditions were setup so there were only specific combinations of figures, or there were no solutions at all) were considered a fair game. As an example, another department of Moscow University, namely VMK ("Vychislitel'noy Matematiki i Kibernetiki", Computational Mathematics and Cybernetics) always included one of them into their written exam (which everybody had to pass). The dirty trick here was that for the same result (3 problems out of 5) a "clean" student would get the highest grade (5), while undesirables would get "barely passed" (3), at best. Still, the request to calculate the derivative of $\log(\log(\sin x))$ were a part of folklore, education, and mathematical culture (at least, in the best schools).

August 22, 2005

Misha,

I looked a little more into Kanevsky and Senderov's essay, and my attention was attracted by Igor Averbakh's problems on p. 116 and Ilan Vardi's comment on these problems in his "Remarks" on p. 134.

1. *Apparently, Ilan misunderstood the problem. Ilan Vardi interpreted the problem as finding solutions (A, B) in integers while it seems that this was not required. For each pair (A, B) the equation has some particular*
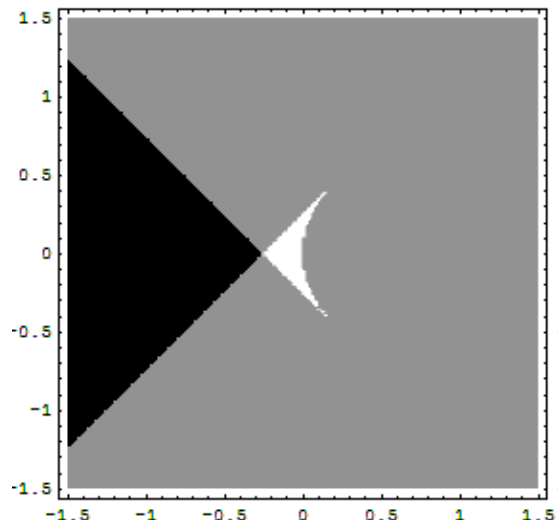
and distinct number of solutions (assuming x is real). Therefore, we can define

$$M_n = \{(A, B) : \text{ equation has exactly } n \text{ solutions}\}.$$

Obviously, M_n is empty for $n > 4$. I attach the file with an illustration. The white segment is M_4, the black M_0, the gray M_2. M_1 and M_3 are on the boundaries of the distinctly colored domains. The solution is rather technical and boring. No bright ideas, just pure calculation. On this graph, the horizontal axis is A while the vertical axis is B.

2. Igor's second problem makes me think there is a typo somewhere; or is it intentionally constructed to have no roots? Do you think it is possible to check?

August 24, 2005

I got an impression that you might feel that my comments exonerate anti-Semitic practitioners. This is not so. I am just separating apples from oranges. I did have my share of anti-Semitic experiences first-hand. I do feel the practice was revolting. Anti-Semites used each and every rule in the book to harm children, but they did not necessarily invent the book. The exams were biased. Matmekh LGU admitted just a single Jew (by passport) in 1980. I do know Hamburg score for many of my classmates vs. those admitted. Their lives were broken. Not necessarily during the math exam — LGU preferred composition. I admire A. M. Vershik very much, for that he was able to put math above political sins of the past. I do regret I did not know him better in my university years. He is an amazing person. I guess he is right to a degree: to ignore but not forget. Want to do math — fine. Shake hands — no.

Stanislav Lipovetsky

October, 2005

Dear Misha,

This book of yours is really a great and noble enterprise to preserve the memory of all young would-be scientists who suffered and perished from Soviet anti-Semitism. What happened was, indeed, an intellectual, mental, and psychological genocide, which was imposed on many, in addition to imprisonments and very probable murder of selected individuals. I myself periodically thought about such a book, so I am very grateful to you for actually performing this work!

In 1965, I was 200% ready for entrance examinations. I finally succeeded in getting admission to MGU, Dept. of Physics, but only "Vechernee otdelenie" (evening course). All Jews of MGU's Dept. of Physics belonged to this evening course, I never met a single one Jewish regular student.

I graduated with degree in theoretical nuclear physics, and worked, for some time, at the Institute of Nuclear Physics of MGU. In about 1973 they began "ethnical cleansing" to ensure "Juden-frei" environment, and I was fired.

After that I couldn't find any work in physics, and began to work as a "mathematician in economics." Evidently, at that time they hoped to revive economy even with such remedy as Jews. Well, after all we can conclude that Sonya Vlas'evna helped us to leave that unhappy country sooner.

I had begun the process of leaving USSR in 1977, but could leave only in 1989. I immigrated to Israel where I lived for about 6 years, working at the Dept. of Management, Tel-Aviv University.

Then in 1995 I and my wife moved to USA, two years in NYC, and in 1997 we moved to Minneapolis, with a more normal social environment.

Daryl Vaughn

sci922@hotmail.com

February 16, 2006

What should a Jewish child (undesirable for admission to Moscow University as your book describes) have done?

Mathematics is supported by the state primarily because it helps society. A bright, top mathematician at Moscow University would help Russian society. But your book describes a Russian society that was corrupt and evil. Is it not unethical to help such a society? Thus, would it not have been unethical for a Jew to go into mathematics and thereby help his own enemies?

You might argue that the Jew should, once admitted, work to improve conditions in the society. But this is not a mathematician's job, it's a politician's. Such a smart person should go into politics, not math.

For that matter, what should a brilliant Jewish mathematician, suppose the Russian analog of Paul Cohen, have done had he been rejected from Moscow University? Insofar as he does anything useful for the society he only helps his enemies.

And how is the Russian situation even different in kind from today's university admission practices in America, which routinely take race and ethnicity into account?

It seems to me that if we accept that what the Russians did was wrong, then we inevitably must conclude that the what the Jews did, or those who did not actively fight the system, was wrong as well; and furthermore, that the U.S., with its affirmative action, is equally wrong (in which case how are we in a position to criiticize)?

I have an alternative hypothesis: that what the Russians did was not wrong at all.

For what the Russians did was wrong only if you accept the premise that the best future mathematicians should be admitted to the University, i.e., those who prove the best theorems and who know math the best.

But suppose we say that rather, the students should be admitted to the University who help the University itself the most? Then we see that part of helping the University is the ability to draw in funds or, in Russia, draw in political support. Since the Jews, as is clear from the book, did not have political support and were unlikely to help get it for the University, it is in the University's best interest not to accept Jews.

Again, this is precisely what happens in the U.S.: in faculty hiring decisions, the key criterion is usually how much grant money the faculty member can be bring in. This is another way of saying that the political and economic influence of the faculty member is considered part of his value to the University. No University would hire faculty based only on how talented and brilliant he was — but social, political, and economic factors are given instead primary weight, as it is the future of the University as a whole that is paramount.

Suppose a brilliant mathematician was up for tenure but had been convicted of various drug crimes. Even those who thought he was innocent or who thought drug laws were unfair would still vote against his tenure because (hypothetically anyway) he would not bring in grant money. So how is this different from the Jewish situation in Russia? Like a brilliant U.S. scientist who is poor at grant-getting for whatever reason, the Jews were poor at the Russian analog of grant-getting — and it was in the best interest of the University, thus, to reject them.

Finally, as a comment, the level of scholarship in the Intellectual Genocide chapter was disappointingly poor. The authors continually refer to documents without proper academic citation, or indeed any clue as to where the documents are, how they got them, or how another user could check this work. This dramatically weakens the force of the presentation in my view (but the preceding paragraphs do take as fact its assertions and simply ask: what's wrong with that?).

E. G. Karpel

March 16, 2006

Дорогой Миша!

С удовольствием пишу на родном русском языке. И кириллицей мне значительно легче выразить вам то глубокое чувство удовлетворения, которое испытала я лично и мои многочисленные друзья, ознакомившись с Вашей книгой. Жаль, что она недостаточно известна ни широкой публике, ни даже в непосредственно заинтересованной математической среде. Со своей стороны я пытаюсь сделать всё, чтобы её прочитало максимальное количество людей, и каждый раз получаю изъявления благодарности от прочитавших. А ведь и я узнала о ней, можно сказать, совершенно случайно.

Ваша Е. Г. Карпель

16 марта 2006

Alexander Soifer

March 26, 2006

I am very pleased that you put in an effort to continue a fine tradition of "It Seems I am a Jew." Yet, I personally do not believe your book has come out as well as it could. The main problem for me is your choice of the "solo violinist" (Vardi) who does not understand, nor has made an effort to understand the subject matter. Attached please find my review.

A review by Alexander Soifer

on **YOU FAILED YOUR MATH TEST, COMRADE EINSTEIN: Adventures and Misadventures of Young Mathematicians**; edited by M. Shifman, World Scientific, 2005.

The publisher describes the book as follows:

> *"This groundbreaking work features two essays written by the renowned mathematician Ilan Vardi. The first essay presents a thorough analysis of contrived problems suggested to "undesirable" applicants to the Department of Mathematics of Moscow University. His second essay gives an in-depth discussion of solutions to the Year 2000 International Mathematical Olympiad, with emphasis on the comparison of the olympiad problems to those given at the Moscow University entrance examinations.*
>
> *The second part of the book provides a historical background of a unique phenomenon in mathematics, which flourished in the 1970-80s in the USSR. Specially designed math problems were used not*

> *to test students ingenuity and creativity but, rather, as "killer problems," to deny access to higher education to "undesirable" applicants. The focus of this part is the 1980 essay, "Intellectual Genocide," written by B. Kanevsky and V. Senderov. It is being published for the first time. Also featured is the story of the so-called Jewish People's University, the inception of which is associated with Kanevsky, Senderov and Bella Subbotovskaya."*

Clearly, the centerpiece of this collection is the pair of Vardi's articles, with "the second part" and the third part serving as an appendix. This approach reminds an expression about "the tail wagging the dog." Surely, analysis of these admission problems present interest only as an illustration of the Soviet anti-Semitism. Thus, it would have been much more appropriate to make the second and third parts to be central, and use Vardi's articles in appendix. (The choice of International Olympiad problems for comparison was poor — Moscow Mathematical Olympiad would have provided a better "measuring stick.")

Mathematicians around the world ought to treat the articles of the second part as a required reading, for they will learn about a sad reality of their profession under tyranny from powerful sources: "Intellectual Genocide" by B. Kanevsky and V. Senderov; "Science and Totalitarianism" and "Admission to the Mathematics Departments in Russia in the 1970s and 1980s" — both by A. Vershik, and "Entrance Examination to the Mekh-Mat" by A. Shen.

The third part of the book consists of four articles about the so-called Jewish People's University and its founder, Bella Subbotovskaya, who paid with her life for founding this unprecedented humane institution, that attempted to right the wrong of the late Soviet empire: "Free Education at the Highest Price" by K. Tylevich; "Jewish University" by D. Fuchs; "Remembering Bella Abramovna" by A. Zelevinsky; and "Bella Abramovna Subbotovskaya" by I. Muchnik.

The most unfortunate feature of the book is the selection of Dr. Vardi as the spokesman for all authors of the book. Vardi admits: "I have never been to Russia and I don't speak a word of Russian." In spite of his lack of knowledge, he does not hesitate to be highly judgmental. He repeatedly assaults all people (other authors of this book certainly included) as incompetent mathematicians, because

> *"over the last 24 years, it had never occurred to anyone reporting about the problems to even mention this supplementary solution (note that all these people were involved in that system in one way or another)."*

All these hot air accusations are grounded in Vardi's ignorance of the Soviet educational program that did not include complex numbers, and thus neither students nor mathematicians did not seek solutions outside the reals. By the same token Vardi would label incompetent everyone from Pierre de Fermat to Andy Wiles for "overlooking" complex solutions of the Diophantine equation in the Last Fermat Theorem! Vardi goes further, and claims that these incompetent critics of the problems before him and Jewish students who failed these problems are also guilty parties, in addition to the Soviet anti-Semites:

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> "The title Intellectual Genocide is quite appropriate, but I believe that it should be applied to **all** [Vardi's emphasis] parties involved."

Vardi proudly declares:

> "In subsequent years, my work on the Mekh-Mat Problems put me in the [sic] position of arbiter for such conflicts."

How did "the arbiter" rule?

> "On at least two occasions, I had to intervene on the behalf of Russian mathematicians whose visits to universities were in jeopardy due to their previous political activity. I am glad to say that my efforts were successful. I hope that this will convince anyone looking at this book that its purpose is not retaliation against former wrongs. On the contrary, the authors of this work have been instrumental in protecting the rights of the perpetrators of wrongs described in this work."

No, Dr. Vardi — the victims of anti-Semitic persecution deserve help, not the perpetrators. At the very least, the perpetrators of crimes merit the punishment by glasnost. Their names must be assembled and published, together with their deeds, so that respectable members of the world's mathematical community do not shake their hands, and do not honor them with VIP visits — if we are to learn anything from the past.

Vardi alleges "the authors of Intellectual Genocide, admit that their evidence is anecdotal." This is outright not true. I, for one, went through discriminatory entrance exams in 1966. I witnessed Yuri Merzliakov, Arkady Slinko, and Shestakov, publicly smearing the Latvian Jew Dr. Levich at the Soviet National Symposium in Tiraspol in 1974, with the current Vice-Rector of Moscow State University Alexander Vassilyevich Mikhalyov presiding over the ordeal. When I was ready to leave the Soviet paradise in 1978, I received a phone call from Prof. Gregory Soifer (no relationship), who told me:

> "Do not be discouraged if the paper you recently submitted to Mathematical Notes will not be accepted. My colleague here at Tomsk University received your paper from the Editor Yuri Merzliakov with the charge to 'give a negative review or return without one.'"

The reason was utterly trivial: It seemed I was a Jew.

Herbert Mehrtens coined the term "irresponsible purity" for scientists who pursued their pure academic fields in the Third Reich and assumed no responsibility for thus serving and strengthening the criminal state (Mehrtens, H., Irresponsible purity: the political and moral structure of mathematical sciences in the National Socialist state, Science, Technology and National Socialism, by Renneberg, M. and Walker, M., Eds., Cambridge University Press, 1994, 324-338 and 411-413.) The time is long overdue to agree that even mathematicians are not above the standards of decency and not above the law.

March 31, 2006

Dear Misha,

I am sorry that my review hurt your feelings. Permit me to answer some of your points. I know personally Mark Saul, and Ilya Muchnik, and Alyosha Kanel-Belov (one of the organizers of the Russian publication on Subbotovskaya). I have never talked politics with Mark. But I cannot imagine a more immoral opinion than that of Vardi, which he expresses on behalf of ALL authors. I completely disagree with you here. What you are saying is irrelevant to the case at hand. You are the editor of the book, and you have allowed Vardi to speak on behalf of all authors, and that includes on your behalf. Your book is not a "prokhodnoy dvor," nor a discussion group — it is your means of self-expression. You wanted to use Vardi's math analysis (which was poor already when he chose wrong comparison in IMO), fine. But you let him preach morality, and his morality is immoral — you did not have to allow that. And if you did, and wanted to be so all-inclusive, you could have written your own rebuttal, and explanation that Vardi does not speak for all authors. Ultimately, you are the editor, not a by-stander, and you are responsible for the content of your book — the more so since the book is important to you and you worked on it for 4 years.

What truly bothers me, every time I think about it, is this. You are obviously a good man, "our man," and you give the platform (your book) to the guy who categorically states that the world must forget and forgive anti-Semites, perpetrators of persecution of the Jews, and invite them as VIP's to the West. He is "proud" to have done so!

Oscar Sheynin

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June 14, 2006

Hi,

An addition to your study: the famous Markov published a letter in a newspaper in 1913 protesting against the same practice in a Russian provincial university.

Oscar Sheynin

Andrei Andreevich Markov, *1856-1922, one of the best students of Chebyshev, was an outstanding mathematician, Professor at St. Petersburg University from 1886 to 1905 and a member of the St. Petersburg Academy of Sciences since 1886.*

In 1913, a Jewish student M. Zhoftis applied for admission to Kharkov Technological Institute. During his entrance examination in mathematics he was

asked to solve the following equation

$$\frac{x^4 + 5}{x + 1} + \sqrt{\frac{2x^3}{x^2 + 1}} = 4x\,.$$

One can transform it into a polynomial equation of the 10-th order. Zhoftis managed to guess one of its roots,

$$x = 1\,.$$

Dividing the polynomial of the 10-th order by $x - 1$ one gets

$$-25 + 15x + 14x^2 + 24x^3 + 26x^4 + 4x^5 - 14x^6 - 6x^7 + x^8 + x^9 = 0\,.$$

M. Zhoftis could not find the solution to the above equation analytically. He described his misadventure in a letter to a newspaper. Markov, upon hearing about this, sent a letter to another newspaper where he called the examination a humiliation [Grodzensky 1987, pp. 102-104].[1]

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[1] S. Ya. Grodzensky, "*Andrei Andreevich Markov*," Nauka, Moscow, 1987 (in Russian);
С. Я. Гродзенский, «*Андрей Андреевич Марков*». М.: Наука, 1987.

A discussion

February 21, 2007

Враньё!!!! В советских школах и вузах никто не обращал внимание на национальность. Отслеживали и оценивали только успеваемость и поведение. Да, и ещё — важно было материальное положение в семье. Бедным государство и школьный родительский комитет помогали бесплатными учебниками, одеждой и питанием. Все делалось для того, чтобы любой ребёнок мог получить образование в соответствии со своими способностями. Это сами евреи, наверное, выдумывали всякие страсти про жизнь в СССР для того, чтобы заиметь материальные и моральные преимущества статуса беженца за рубежом. Мне, например, пришлось обучаться в двух школах. И ни в одной из них никогда не возникал вопрос о национальности ни у детей, ни у взрослых. Школы были обычные, провинциальные. В моём университете тоже было довольно много студентов различных национальностей СССР (в том числе и евреев) и учащихся из дружественных нам стран мира. Все учились и развлекались вместе, и никаких не только конфликтов, а даже разговоров о плохих и хороших национальностях не было.

Правдин

February 22, 2007

Господину Правдину я советую почитать книгу «You failed your math test, Comrade Einstein», вышедшую в издательстве World Scientific в 2005 году. Там подробно описаны издевательства над еврейскими абитуриентами на мехмате МГУ на протяжении многих лет. Всё задокументировано. Хотя опубликованные документы относятся к мехмату МГУ, я не думаю, что это происходило только там.

Что касается школ, то во всех странах мира над «непохожими» издеваются. Моя дочь год училась в благополучной Швейцарии, так над ней швейцарские ученики так издевались за её «нешвейцарскость», что она заболела. Всё дело в том, как к этому относится администрация.

Маша Абрамова

February 22, 2007

http://www.gazeta.ru/education/letters/1458676.shtml?page20

> *Маша Абрамова: «Господину Правдину я советую почитать книгу „You failed your math test, Comrade Einstein“, вышедшую в издательстве World Scientific в 2005 году».*

Вот в том-то и дело, что вы всё это из различных, неизвестно кем и для чего написанных книжек берёте. А вам отвечают люди, которые сами жили в это время. Понимаете, САМИ! Они — непосредственные свидетели. А в книжках можно что угодно написать. Если уже всю историю наизнанку выворачивают, если уже могилы советских солдат — освободителей Европы и Мира от фашизма — оскверняют, если существование холокоста под сомнение ставят, то о каких документированных фактах из каких-то книжек вы пишите! Кому выгодно ссорить народы, тот и пишет подобные враки. А вы всему этому верите и распространяете! СМИ, Интернет, массовую литературу активно используют для обработки мозгов в определённом направлении. Разделяй и властвуй -— вот цель заказчиков статей, подобных той, которую мы обсуждаем, и литературы, подобной той книге, которую вы приводите.

Леон

Arkady Lifshitz

June 15, 2007

<center>*HOW THE "PEOPLE'S UNIVERSITY" WAS BORN*</center>

The story started twenty-nine years ago, in July 1978. At this time, the teacher of the well-known mathematical school № 2, Valery Senderov, had his first attempt at monitoring the entrance examinations to the prestigious Moscow universities (Phys-Tech = MFTI = Moscow Institute for Physics and Technology; Mekh-Mat of MGU = Department of Mechanics and Mathematics of Moscow State University; MIFI = Moscow Institute for Engineering and Physics). He assisted his former students, and my classmates (among them was Vadim Knighnik, a talented scientist, who left his mark on modern physics despite his very short life — he died at the age of twenty-five), in preparing mathematically and legally based documents for the Appeal Committee. It was required because the applicants of Jewish origin had been treated unfairly by the so-called "killer" problems on exams and by other methods, aimed to prevent their entrance to the universities. Among the graduates of physics-mathematics schools, the percent of Jewish students was about 25-30%.

*With the help of Senderov, I, for example, have successfully appealed to the Phys-Tech about the results of my **oral** examination in mathematics, and my grade was raised from 3 to 4 (sic!). After about a week and a half at Phys-Tech, Senderov moved to MGU, to proceed with his activities against the Appeal Committee of Mekh-Mat.*

Apparently, it was a request of the time, and Bella Abramovna Subbotovskaya, independently of Senderov, began the same attempt at helping attendants at another department of the Moscow University, namely VMK ("Vychislitelnoy Matematiki i Kibernetiki" =Department of Computational Mathematics and Cybernetics). In my opinion, Bella and Senderov had not known one another until this time, but due to their similar actions in supporting attendants and their parents, they met for the first time on the stairs of the MGU main building in July 1978.

Each of them supported his own circle of school graduates, but naturally, both sets, even if they didn't intersect, were closely related.

My successful appeal notwithstanding, I was not admitted to Phys-Tech, and I started my studies in "Theory of structures" in MISI (Moscow Civil Engineering Institute). Jenya Flitman, a close friend of mine until this day, shared the same fate, after his failure to be admitted to VMK (today he is a Leading Software Developer in IKI RAN = Space Research Institute of the Russian Academy of Sciences). Jenya graduated from the math school № 57 and we recognized each other during the entrance examinations to MISI, when both of us had finished the written math exam after about a quarter of an hour. Jenya met Bella Abramovna during his attempt to be admitted to VMK MGU.

The examinations period was over, and Bella started to think of ways to help her proteges who could not attend MGU to proceed with their education in mathematics. The first idea was quite simple — to participate in existing sem-

<center>39</center>

inars. One of the seminars – on discrete mathematics, if I remember correctly – had already started. So, in late September or in the beginning of October 1978, she invited some of the students to her apartment with the aim of explaining subjects of missed lessons and preparing for the further ones.

When I first arrived to Nametkin St., I had a very strange impression. In a standard "chruschoba" (a small, two-room flat, in the residential buildings of 4-5 stories, built at the beginning of the sixties during the N. S. Chruschev era of the Soviet regime) most of the space was occupied by musical instruments — piano, cello, and a violin. The small woman with flickering, and at the same time sad, Jewish eyes greeted us. She radiated positive energy and accepted without doubt anyone who knocked on her door. The charming atmosphere of the mix of math and music set free the intellectual ability of every one of the guests and motivated a positive-oriented thinking.

There were four of us — Enek (Einstein) Averbuch (Yes, Prof. Shifman, it really was Einstein who failed his math test!), Senya Selitsky (if I remember correctly), Jenya Flitman, and I. During the meeting, an idea was raised — why not proceed with the special course of mathematics that Senderov taught us in school № 2, but on a new, voluntary basis and invite all of our classmates from math schools №№ 2, 7, 57, 91, 179, 444, and others, who couldn't attend the July VUZes (MGU, MFTI, MIFI)? It would be like a math group for the technical universities' students.

Bella offered her apartment as a meeting place and, one week later, the first lecture by Senderov took place. About a dozen students arrived, and naturally, there were more than 85% Jews among them. The room underwent some transformations: the cello was moved from its original position and a small chalkboard on an unstable tripod took its place.

Simultaneously, Bella started to recruit her Mekh-Mat classmates from the fifties to participate as lecturers. And from the second or the third meeting A. Vinogradov and A. Sosinsky (correct me, if it's not exact) started teaching their courses.

One very important part of the learning was the preparation of the lecture notes. After each lesson, two or three students received this task. During the week following the lecture they, based on the tape records and on their own notes, prepared the handwritten text and all the required figures and drawings.

[For me, personally, there does not exist a more fruitful method of understanding the learned material by students. The only one that's more effective is giving the lecture on the subject yourself.]

The handwritten text was reviewed by the lecturer and by Bella herself and after all the required corrections she typed it. At the beginning, when the number of participants was not so large, the "samizdat" procedure – " «Эрика» берёт четыре копии" – was applied. The "authors" of the notes also inserted the formulas into all of the copies. Two weeks after the lecture all of the students received their own printed copy.

Later, an anonymous source of photocopy was found. It was a great achievement in itself, and for obvious reasons I did not ask Bella about it. The photocopies, as well as the delicious sandwiches that Bella prepared with great

care for every meeting and fed to hungry young bodies after a couple of hours of intensive intellectual work, required a certain amount of cash. It was especially important, because at this time Bella's only official position, with minimal salary, was "dvornik" (= "yard-keeper"). Later she started to teach math in the local elementary school. Therefore, money was collected for these expenses only (NOT for Bella's or someone else's salary) and the limit of the sum was a few rubles only (and at this time, definitely, it was not "fivers" as remembered by Prof. D. Fuchs).

Thus, the "People's University" was born. A small remark concerning the name: Bella was aware of Senderov's involvement (she called him a "true bolshevik," referring to his ideological motivation) and as a consequence, of possible attention of the KGB to our meetings. Therefore, she tried to put aside any mention of politics. But it was not possible, due to the nature of the organization that came to life by her enthusiasm in very special circumstances. She used to say, "It is the People's University," and to add after a pause, "and we know of **what** People!"

Haifa, June 15, 2007

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КАК ВОЗНИК «НАРОДНЫЙ УНИВЕРСИТЕТ»

Начало этой истории относится к июлю 1978 года. В это время преподаватель математики одной из лучших московских математических школ — Второй школы — Валерий Сендеров предпринял первую попытку сопротивления антисемитской политике приёмных комиссий престижнейших столичных ВУЗов — Физтеха, Мехмата МГУ и МИФИ. Во время приёмных экзаменов он помогал готовить математически обоснованные и юридически грамотные апелляции своим вчерашним ученикам — моим одноклассникам (в их числе был Вадим Книжник – блестящий учёный, сумевший, несмотря на свою очень короткую 25-летнюю жизнь, оставить заметный след в современной физике). Необходимость в апелляциях была обусловлена тем, что практичекси все абитуриенты еврейского происхождения (или подозреваемые в этом грехе) получали на вступительных экзаменах по математике так называемые «гробы» — задачи, по уровню сложности эквивалентные, а зачастую и превосходящие задачи Всесоюзных и международных математических Олимпиад. Это был только один из многих методов, применявшихся приёмными комиссиями июльских ВУЗов в их злостных потугах не допустить поступления абитуриентов-евреев. Среди выпускников физико-математических школ доля последних составляла от одной четверти до одной трети от общего числа.

*Активная помощь Сендерова была существенным фактором, позволившим лично мне при поступлении на Физтех успешно сапеллировать результаты **устного** экзамена по математике и добиться изменения оценки за этот*

экзамен с 3 на 4 (sic!). После примерно полутора недель пребывания в Долгопрудном, где расположен Физтех, Сендеров переместился на Ленинские Горы и сосредоточил своё внимание на приёмной комиссии Мехмата МГУ.

Очевидно, это было веление времени, поскольку в те же самые дни, и совершенно независимо от Сендерова, Белла Абрамовна Субботовская мобилизовала себя на помощь абитуриентам-евреям (или считавшимся таковыми) на другом факультете Московского Университета — ВМК (факультет «Вычислительной Математики и Кибернетики»). Мне кажется, что до этого момента Белла и Сендеров не были знакомы друг с другом. Но благодаря однонаправленности их деятельности по поддержке поступающих и их родителей, их встреча и знакомство на ступенях Главного Корпуса МГУ летом 1978 года были предрешены.

У каждого из них было свой круг вчерашних мат-школьников, нуждавшихся в помощи и поддержке. Однако, естественным образом, если и не пересекались, то, уж точно, соприкасались.

Несмотря не успешную апелляцию, я не был принят на Физтех как «не прошедший по конкурсу» и начал учёбу в Инженерно-Строительном институте с узкой специализацией «Теория сооружений». Та же участь постигла моего близкого друга с того времени и по сей день, Женю Флитмана, после безуспешной попытки поступления на ВМК (сегодня Е. Флитман — ведущий разработчик программного обеспечения в Институте Космических Исследований РАН). Женя закончил математическую школу № 57, и мы с лёгкостью «вычислили» друг друга на вступительных экзаменах в МИСИ, когда одновременно закончили письменный экзамен по математике примерно через четверть часа после его начала (на экзамен было отведено 2,5 или 3 часа, сейчас я уже точно не помню). В процессе своего поступления на ВМК МГУ и неизбежной апелляции Женя познакомился с Беллой Абрамовной.

Пора вступительных экзаменов была позади, и Белла стала задумываться о возможных путях продолжения математического образования тех, кто не удостоился чести переступить порог главного ВУЗа страны. Первое решение этой задачи было простым и почти очевидным — участие в действующих математических семинарах. Один из таких семинаров – кажется, по дискретной математике – уже начал свою работу. И вот, в конце сентября или в начале октября 1978 года Белла пригласила к себе на квартиру нескольких человек, не желавших мириться с тем, что дорога к настоящей математике для них закрыта. Цель встречи была крайне проста — наверстать пропущенный материал первых одного-двух занятий и подготовиться к дальнейшему участию в работе семинара.

Квартира на Намёткина, в которой я оказался впервые, поразила меня своей необычной обстановкой. В стандартной двухкомнатной «хрущёбе» всё свободное место было занято музыкальными инструментами — у одной стены стояло фортепиано, на другой висела скрипка, а в углу расположилась виолончель (или это был контрабас?). Невысокая женщина с искрящимися и, в то же время, печальными еврейскими глазами приветствовала нас. Она излучала благожелательность и без тени сомнения распахивала дверь своего дома перед каждым, кто ступал на порог. Магичекая атмосфера

этого дома, наполненная математикой и музыкой, не слышной, но присутствующей в комнате зримым фоном, раскрепощала всех присутствующих и, вместе с тем, консолидировала мыслительный процесс, направляя его в созидательное русло.

Нас было четверо — Энек (по паспотру Эйнтштейн) Авербух (да, проф. М. Шифман, Эйнштейн, которого завалили на экзамене по математике, действительно существует!), Сеня Селицкий (если мне не изменяет память), Женя Флитман и я. В процессе разговора возникла идея: «А почему бы не продолжить спецкурс по математике, который Сендеров вёл во Второй школе, в новых условиях? И почему бы не пригласить туда наших одоклассников и других выпускников 2, 7, 57, 91, 179, 444 московских матшкол из числа тех, кто не прошёл в июльские высшие учебные заведения (МГУ, МФТИ, МИФИ)? Что-то вроде математического кружка для студентов техническох ВУЗов. . . ».

Белла предложила свою квартиру в качестве места встреч и, неделю спустя, Сендеров провёл первое занятие. На него собралось около полутора десятка человек. Естественным образом, подавляющее большинство из них, более 85%, были евреями. Комната, в которой мы собрались, претерпела определённые изменения: виолончель переместилась в другой конец комнаты, а её место заняла небольшая школьная докса на неустойчивой треноге.

В то же время Белла начала рекрутировать профессиональных математиков – своих однокурсников по Мехмату 1955-60 годов – в качестве лекторов на общественных началах. И уже на втором или третьем по счёту занятии Александр Виноградов и, если не ошибаюсь, Алексей Сосинский начали читать свои курсы.

Важным элементом учебного процесса являлась подготовка конспекта лекций. Эта задача возлагалась на двух-трёх слушателей, всякий раз выбиралась новая пара (или тройка). В течение недели после каждой лекции они на основе магнитофонной записи и собственных заметок составляли рукописный вариант конспекта, включая все необходимые для иллюстрации рисунки.

С моей точки зрения, нет лучшего способа для усвоения и понимания прослушанной лекции, чем составление такого развёрнутого конспекта. Эффективней может быть только собственно преподавание изучаемого предмета.

Рукописный текст правился лектором при активном участии самой Беллы, после чего она собственноручно готовила машинописный вариант. Вначале, когда число слушателей было сравнительно невелико, применялся классический метод самиздата – « „Эрика“ берёт четыре копии». «Авторам» записок приходилось также от руки вписывать формулы во все экземпляры, напечатанные на папиросной бумаге. Итак, через две недели после прочитанной лекции каждый из слушателей получал в своё распоряжение её полноценную копию.

Позднее у кого-то появился доступ к изготовлению ксерокопий. В те времена это само по себе являлось большим достижением и, по вполне по-

нятным соображениям, я даже не пытался выяснить у Беллы источник происхождения копий. Ксерокопии, также как и невероятно вкусные бутерброды, которые Белла с великим тщанием готовила в невообразимых количествах к каждому занятию (а затем скармливала их молодым организмам, нуждавшимся в восстановлении затрат физической энергии после друх-трёхчасового интенсивного умственного напряжения) требовали неминуемых финансовых расходов. Это было тем более актуально, поскольку единственным источником доходов Беллы в то время была работа дворником в ЖЭКе с соответствующей этой должности зарплатой. Позднее она начала преподавать математику в начальных классах ближайшей районной школы. Для компенсации расходов на копирование и на еду, и только на эти цели, все участники сдавали небольшие суммы наличных денег. Я не помню точные цифры, но эти суммы были ограничены считанными рублями (для тех, кто забыл — студенческая стипендия составляла 40 рублей, а повышенная для отличников — 50 рублей в месяц), но в любом случае это не были «пятёрки», как указано в воспоминаниях проф. Д. Фукса, по крайней мере в то время, о котором я говорю. Особо следует подчеркнуть, что ни копейки из собранных денег не предназначалось ни для Беллы лично, ни для кого бы то ни было ещё из числа преподавателей. Все они работали совершенно безвоздмездно, что называется «за идею».

Так появился на свет Народный Университет. Небольшое замечание по поводу этого названия. Белла отдавала себе полный отчёт в том, что участие Сендерова (которого она называла «настоящим большевиком», аттестуя так степень его идеологической ангажированности) в организации и функционировании НУ чревато почти неизмежным пристальным вниманием КГБ (Сендеров был активным участником правозащитного движения). Поэтому она, по мере возможности, старалась дистанцироваться от каких бы то ни было политических аллюзий, всячески подчёркивая чисто образовательный характер НУ, созданного её энтузиазмом и кропотливым трудом. Еврейский ворос был здесь вторичен, но в силу естественных причин и очень специфических обстоятельств возникновения НУ, он не мог быть полностью затушёван. «Это Народный Университет», – говорила Белла, а после паузы добавляла: «И мы знаем **какого** народа!»

P. S. Сегодня каждый из нас, питомцев Беллы, прожил на свете уже больше лет, чем было отведено самой Белле до той тёмной осенней ночи в Чертаново, безжалостно оборвавшей её жизнь. И оглядываясь назад, на минувшую с той поры четверть века, мало кто из нас может сказать, положа руку на сердце, что он совершил в жизни что-то, хотя бы отдалённо приближающееся к тому, что сумела создать Белла. Она подала пример того, что может совершить Человек в сумрачной атмосфере эпохи застоя, и расплатилась за это самой высокой ценой — собственной жизнью!

И единственное, что мы можем (и обязаны) сделать для Беллы в благодарность за все её добрые дела — это сохранить память о ней!

Память её будет благословенна —

Хайфа, 15 июня 2007 г.

Conference at Technion, Haifa, Israel

June 12 - 19, 2007

DIFFERENT APPROACHES TO COMPLEXITY
IN MATHEMATICS AND MATHEMATICAL PHYSICS

In memory of Bella Subbotovskaya

Bella Subbotovskaya, 1961.
Courtesy of Ilya Muchnik.

The goal of the conference is to bring together researchers studying various forms of complexity (in the most general sense of this notion and not only the algorithmic complexity) in mathematics and mathematical physics.[1] In memory of Bella Subbotovskaya, a mathematician, who worked in the algorithmic complexity theory, and an unknown hero of Soviet mathematics.

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[1] Abstracts can be found at
http://www.math.technion.ac.il/cms/2006-2007/Different-Approaches/abstracts.pdf

List of the conference participants

N. Alon	Tel-Aviv University, Tel-Aviv, Israel
D. Fuchs	University of California at Davis, USA
V. L. Ginzburg	University of California at Santa Cruz, USA
J. Hass	University of California at Davis, USA
A. Kanel-Belov	Bar Ilan University, Ramat-Gan, Israel
Y. Kifer	Hebrew University, Jerusalem, Israel
M. Krivelevich	Tel-Aviv University, Tel-Aviv, Israel
F. Malikov	University of Southern California, Los Angeles, USA
S. Matveev	Chelyabinsk State University, Chelyabinsk, Russia
A. Nabutovsky	Pennsylvania State University, University Park, USA, and University of Toronto, Canada
L. Potyagailo	University de Lille, Villeneuve d'Ascq, France
A. Reznikov	Bar-Ilan University, Ramat-Gan, Israel
L. Rozansky	University of North Carolina at Chapel Hill, USA
M. Sapir	Vanderbilt University, Nashville, USA
B. Shapiro	Stockholm University, Stockholm, Sweden
A. Shen	University of Marseille, France, and Independent University of Moscow, Russia
M. Shifman	University of Minnesota at Minneapolis, USA
M. Sodin	Tel-Aviv University, Tel-Aviv, Israel
S. Tabachnikov	Pennsylvania State University, University Park, USA
A. Vainshtein	University of Haifa, Israel
A. Vinogradov	University of Salerno, Italy
S. Weinberger	University of Chicago, USA
S. Yakovenko	Weizmann Institute of Science, Rehovot, Israel
S. Zelditch	Johns Hopkins University, Baltimore, USA

Organizers of the conference

Michael Entov	Technion, Haifa, Israel
Leonid Polterovich	Tel Aviv University, Tel Aviv, Israel
Michael Polyak	Technion, Haifa, Israel

Conference Program

Tuesday, June 12

Morning Session

08:30 - 09:00	Registration
09:00 - 10:00	Shmuel Weinberger *Entropy, Critical points, and Complexity*
10:00 - 10:30	Coffey break Faculty lounge, 8th floor, Amado Mathematics Building
10:30 - 11:30	Michael Krivelevich *Pseudo-random graphs – capturing the complexity of randomness*
11:45 - 12:45	Dmitry Fuchs *Knots in contact geometry*

Afternoon Session

15:00 - 16:00	Lev Rozansky *Commutative algebra and 3-dimensional topology*
16:00 - 16:30	Coffey break Faculty lounge, 8th floor, Amado Mathematics Building
16:30 - 17:30	Sergei Tabachnikov *Complexity of inner and outer polygonal billiards*
18:00	Reception hosted by the Center for Mathematical Sciences

Wednesday, June 13

Morning Session

09:00 - 10:00	Sergei Matveev *Complexity in low-dimensional topology*
10:00 - 10:30	Coffey break Faculty lounge, 8th floor, Amado Mathematics Building
10:30 - 11:30	Mark Sapir *Asymptotic geometry and complexity of groups*
11:45 - 12:45	Noga Alon *The complexity of properties of large graphs*

Afternoon Session

15:00 - 16:00	Leonid Potyagailo *Some group-theoretic properties of non-uniform arithmetic lattices in the hyperbolic spaces*
16:00 - 16:30	Coffey break Faculty lounge, 8th floor, Amado Mathematics Building
16:30 - 17:30	Joel Hass *Knots, area and computational complexity*

Thursday, June 14

Morning Session

09:00 - 10:00	Alexander Vinogradov *What really are differential calculus and (nonlinear) PDEs and what mathematics is necessary for quantum physics*
10:00 - 10:30	Coffey break Faculty lounge, 8th floor, Amado Mathematics Building
10:30 - 11:30	Alexei Kanel-Belov *Quantization, authomorphisms of Weil algebra and Jacobian conjecture*
11:45 - 12:45	Yuri Kifer *Complexity, chaos and their probabilistic manifestations in deterministic dynamics*

A trip to the North of Israel

Friday, June 15

09:30 - 10:00	Refreshments
10:00 - 13:00	Historical session

Remembering Bella Subbotovskaya and her University

1. A. Shen
   How did it all start?

2. B. Kanevsky
   B. A. Subbotovskaya, V. Senderov and "People's University"

3. D. Fuchs
   Admission of the Jews to MexhMat: an overview

4. A. Lifshitz
   How the "People's University" was born

5. A. Reznikov
   A few reminiscences about some peculiarities of getting mathematical education in Moscow in 1980s

6. M. Shifman
   B. Subbotovskaya's story: an epilogue

Sunday, June 17

Morning Session

09:00 - 10:00	Fyodor Malikov *On two examples of Witten's half-twisted algebra*
10:00 - 10:30	Coffey break Faculty lounge, 8th floor, Amado Mathematics Building
10:30 - 11:30	Boris Shapiro *Root asymptotics for the eigenfunctions to differential operators in 1 variable and Stokes lines*
11:45 - 12:45	Viktor Ginzburg *The Conley conjecture: infinitely many periodic points of Hamiltonian diffeomorphisms*

Afternoon Session

15:00 - 16:00	Alek Vainshtein *Cluster algebra and Poisson geometry*
16:00 - 16:30	Coffey break Faculty lounge, 8th floor, Amado Mathematics Building
16:30 - 17:30	Alexander Shen *Kolmogorov complexity: forty years later*
18:00 - 19:00	Leonid Levitov *How much number theory you need to know to be a sunflower?*

Monday, June 18

Morning Session

09:00-10:00	Misha Sodin *On the number of nodal domains of random spherical harmonics*
10:00-10:30	Coffey break Faculty lounge, 8th floor, Amado Mathematics Building
10:30-11:30	Andrei Reznikov *Identities for periods of eigenfunctions and representation theory*
11:45-12:45	Steve Zelditch *Growth and distribution of zeros of eigenfunctions of the Laplacian*

Afternoon Session

15:00-16:00	Sergei Yakovenko *Principal Theorem of Algebra for non-algebraic functions*
16:00-16:30	Coffey break Faculty lounge, 8th floor, Amado Mathematics Building
16:30-17:30	Alexander Nabutovsky *Complexity of solutions of variational problems in Riemannian geometry*

Tuesday, June 19

A trip in and around Haifa

George G. Szpiro

in Notices of the AMS 54 (2007)

BELLA ABRAMOVNA SUBBOTOVSKAYA
AND
THE "JEWISH PEOPLE'S UNIVERSITY"

Exactly 25 years ago, on September 23, 1982, at about 11 o'clock at night, an accident occurred in a dark street in Moscow. A woman walked along the sidewalk. She had just visited her mother and was on her way home. It was a quiet street, hardly a vehicle passed by at this hour. Suddenly a truck appeared at high speed, hit the woman, and drove off. Moments later another car drove up, stopped for a moment next to the victim, and also drove off. An ambulance came – who had called it? – and took the victim straight to the morgue. The funeral took place the next day.[1] *It was a very low key affair, nobody talked, no eulogy was held. Mourners only whispered among themselves, all the while observed by a few official-looking men. Eventually everybody quietly dispersed. The hit-and-run driver was never found, and the case was closed. The accident had all the trappings of a KGB hit. The victim was the 44-year old mathematician Bella Abramovna Subbotovskaya. In the days preceding her death she had been summoned several times for interrogations to KGB offices. The "crime" about which she was questioned was the organization of a "Jewish People's University".*

It is almost forgotten today, but not so long ago Jews were routinely denied entry to reputable institutes of higher education in the Soviet Union. Although the discriminatory practice was not limited to mathematics, it was especially glaring in this field to which Jews had been traditionally drawn. Twenty-five to thirty percent of the graduates of the high schools that were geared towards physics and mathematics were Jewish; only a handful were admitted to the top institutes. The most prestigious among them was MekhMat, the Department of Mechanics and Mathematics at Moscow State University. The driving forces behind MekhMat's adherence to the anti-Semitic admissions policy decreed from above were V. A. Sadovnichii, currently rector of Moscow University; O. B. Lupanov, MekhMat's dean from 1980 until his death in 2006; and A. S. Mishchenko, professor and senior examiner at MekhMat. But anti-Semitism in Soviet mathematics was not restricted to insignificant, small-minded people. Distinguished Soviet mathematicians were known to be pathological anti-Semites, for example L. S. Pontryagin and I. M. Vinogradov, who wielded enormous power over the lives and careers of Soviet mathematicians, but also, surprisingly, the human rights activist I. R. Shafarevich. The absurd justifications some of them gave for their virulent feelings against Jews – which were buttressed by the enormous administrative power some of them held – was that Jews are genetically programmed to develop mathematical abilities at an early

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[1] Against Jewish tradition, her body was cremated. The urn was later interred in the Jewish cemetery Vostryakovo.

age. By the time ethnic Russians fully develop their mathematical powers, so the reasoning went, all opportunities to study and all faculty positions are already taken by Jews. Such a situation must be prevented by barring the latter from access to higher mathematics education right after high school. A more prosaic reason for the rabid anti-Semitism exhibited by the Soviet authorities was their cowardly desire to blame others for their economic and other failures.

*During the 1970s and the 1980s, up until perestroika, such a policy was strictly enforced. One institute to which entrance was all but barred to Jews was MekhMat. It was – and is – considered the premiere mathematical center in the then-Soviet Union and today's Russia. Jews – or applicants with Jewish-sounding names – were singled out at the entrance exams for special treatment. Written tests, identical for all applicants, were usually no problem for gifted and well-prepared students.[1] The hurdles were raised in the oral exam. Unwanted candidates were given "killer questions" that required long computations or reasoning. Some questions were impossible to solve, were stated in an ambiguous way, or had no correct answer. They were not designed to test a candidate's skill but meant to weed out "undesirables". The grueling, blatantly unfair interrogations often lasted five or six hours, even though by decree they should have been limited to three and a half. Even if a candidate's answers were correct, reasons could always be found to fail him. On one occasion a candidate was failed for answering the question "what is the definition of a circle?" with "the set of points equidistant to a given point." The correct answer, the examiner said, was "the set of **all** points equidistant to a given point." On another occasion an answer to the same question was deemed incorrect because the candidate had failed to stipulate that the distance had to be nonzero. When asked about the solutions to an equation, the answer "1 and 2" was declared wrong, the correct answer being, according to an examiner, "1 **or** 2."[2] One candidate received a failing grade for making use of the "unsubstantiated inequality" $\sqrt{6}/2 > 1$. And if an applicant, against all odds, managed to pass both the written and the oral test, he or she could always be failed on the required essay on Russian literature with the set phrase "the theme has not been sufficiently elaborated."[3] With very rare exceptions, appeals against negative decisions had no chance of success. At best they were ignored, at worst the applicant was chastised for the insolence of showing "contempt for the examiners."*

Such was the setting when, unbeknownst to each other, two courageous individuals, Valery Senderov and Bella Subbotovskaya, decided to do something about the sorry situation. Senderov, who had done work in functional analysis and was a mathematics teacher at Moscow's famed "School Number 2", and Bella, who had already published important papers on mathematical logic, held

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[1] Even this is not quite correct. According to one source, MekhMat officials opened the written exams, which had been handed in carrying only ID-numbers and no names, identified the Jews, and drastically reduced their grades.

[2] On a diffferent occasion, the same examiner told another student the exact opposite: "1 or 2" was considered wrong.

[3] In truly Kafkaesque manner, even a perfect score did not guarantee admittance to a Jewish student. "Grades received at entrance examinations do not play a decisive role for admission to our Institute," the prospectus of the Moscow Institute for Physics and Technology read.

positions at various technical research institutes performing programming tasks and numerical computations. The two met by coincidence in July 1978 on the steps of the main building of Moscow State University, where the entrance exams to MekhMat were taking place. Their aim was to assist students who had just failed the oral exams with documents for the Appeal Committee. Senderov had a further aim in mind: together with his colleague Boris Kanevsky, he was going to document the racially motivated bias and unfairness in the MekhMat entrance exams. Senderov was just talking to one of the flunked students when the examiner rushed out and challenged him. An altercation ensued that soon degenerated into a scuffle; security was called, and Senderov was forcefully removed from the premises. This event marked – as Kanevsky recounted at a recent memorial session at the Technion in Haifa in tribute to Bella[1] – the beginning of an ambitious and dangerous undertaking, the creation of a "Jewish People's University".

Bella Abramovna is described by her friends and admirers variously as loud, energetic, and demanding, but also as warm, kind-hearted, optimistic, with great courage and resolve. She had fallen in love with mathematics beginning in first grade and that love never abated, even though she also informally prepared for a career in music and played several instruments. As an educator "she had the ability to convey her perception to the most varied types of people," her husband Ilya Muchnik would later write.[2] She could evoke appreciation for her subject in almost all persons with whom she dealt, be they grade-school children for whom she designed mathematical games; adults attending evening school, weary from a full day's work; or gifted high-school graduates who were denied entry to Moscow State University.

Bella and Ilya met at a seminar on cybernetics where a paper on how to compose music on a computer was discussed. Bella, who had studied violin for ten years at the music school, and Ilya, who had the idea of studying the statistics of musical fragments in Jewish folk songs by computer, immediately took a liking to each other. After about a year, in the summer of 1961, they decided to get married and moved into a six square meter room with a stove-heater and an outhouse in the yard. They lived in poor surroundings in a beehive of buildings, each of which was occupied by three or four Jewish families, complete with numerous children and grandparents. The common language among the neighbors was Yiddish. The wedding was a very authentic affair held in the yard, with everybody singing Jewish folk songs, accompanied by Bella on the violin.

After their marriage, Bella made a meager living performing engineering tasks for various technical research institutes. She did not like her routine work but did it diligently nevertheless. A change was brought about when the couple's daughter began studying at high school.[3] Bella started wondering

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[1] I will refer to B. A. Subbotovskaya simply as Bella, as everybody did and does. The conference in honor of Bella took place March 12–19, 2007.

[2] Muchnik is now Research Professor at the Department of Computer Science, Rutgers University, New Jersey.

[3] Bella's daughter today lives in the USA and works for a furniture company.

where children of her daughter's school, many of whom were Jewish, would pursue their studies after graduating. This is when she became painfully aware of the dead-end that awaited Jewish children. Even the most gifted among them had practically no hope of studying at first-rate institutes. Bella herself had been lucky enough to attend MekhMat in the mid-1950s, a period after Stalin's death and at the beginning of the Khrushchev era, when Jews were not yet discriminated against. But by now, in the late 1970s, the situation had vastly deteriorated. Bella decided to devote herself to furthering the ambition of dedicated and mathematically gifted high-school graduates. She helped prepare them for the entrance exam to the faculty of mathematics and assisted those denied entry in writing the necessary letters to the appeals committees.

Meanwhile Senderov and Kanevsky wrote the underground classic "Intellectual Genocide" in which they documented the results of their investigations of failed Jewish MekhMat candidates. The mathematical economist Victor Polterovich had collected statistics on the admission of students from Moscow's leading mathematics and physics high schools to MekhMat. In 1979, of the 47 non-Jewish students who applied, 40 were admitted, but only six of the 40 students with Jewish names. This was after a kind of self-selection had already taken place, with many Jewish students not even applying. The questions given to candidates with Jewish names were distressingly difficult, and the reasons for failing the students or denying their appeals were equally hair-raising. Polterovich also wrote a "Memo for students applying to MekhMat who are thought of as being Jewish", which was distributed by Senderov and Kanevsky. But then Bella did much more. She decided to partially restore hope and fairness by giving the rebuffed students an opportunity to obtain a fundamental mathematical education at her home.

Since appeals to the appropriate committee had been of no avail, the failed students were left with no option but to study at institutions that prepared them for professional careers, like the Institute of Metallurgy, the Pedagogical Institute, the Institute of Railway Engineers, or the Institute for the Petrochemical and Natural Gas Industry. They would get a solid grounding in applied mathematics but would have no hope of ever glimpsing beyond the immediate areas of the professions for which they were trained. Pure mathematics would remain out of reach.

But Bella would have none of that. In the fall of 1978 she started an ambitious and unprecedented undertaking in her own home: the "Jewish People's University". Bella's former classmate Alexandre Vinogradov, who had received his doctorate from MekhMat fifteen years earlier and was now a professor at that institute, devised a nonstandard advanced study program for the initial course. Together with former and current Ph.D. students, he taught the initial course.[1] The university began as a study group with a dozen or so students, but news about the undertaking quickly spread by word of mouth. No equipment was available except for a children's chalkboard standing on an unstable tripod.

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[1] Because of ideological differences with other faculty members, Vinogradov left the project after a few months. The point of contention was whether Bella's university should limit itself to teaching mathematics or be part of the broader struggle against the Soviet regime.

Later, a more suitable blackboard was obtained. Since it could not fit through the narrow staircase of the tenement where Bella (now divorced) lived, it had to be hoisted through the fifth-floor window. Bella was the guiding spirit behind every aspect of the unique undertaking. She did not teach herself but solicited the help of former classmates, now established mathematicians, to lecture at her university. The informal institution was open to everyone, but most students and many teachers, though by no means all, were Jewish.

And there was no lack of gifted teachers; the recruited faculty was of the highest caliber. The courses taught in Bella's apartment, and later at other venues, corresponded to the first two years of the MekhMat undergraduate curriculum. Vinogradov, Senderov, Alexander Shen, and Andrei Zelevinsky taught calculus, and Dmitry Fuchs differential geometry and linear algebra; Alexey Sossinski, a Russian born in Paris and brought up in America, lectured on modern algebra; Boris Feigin gave courses on topology and commutative algebra; Victor A. Ginzburg taught linear algebra; Mikhail Marinov – who, after having applied for an exit visa to Israel, labored as a construction worker – lectured on quantum mechanics and field theory; and seminars were run by Boris Kanevsky.[1] Universities all over the world would have been proud to have a faculty of the quality found at Bella's Jewish People's University. Nobody received any money. The teachers took on the selfless and risky task motivated solely by human decency, to right a wrong, and out of love for mathematics. There was even a "visiting" professor: once, during a trip to Moscow, John Milnor came to lecture.

Word of the underground university got around, and the student body grew. Soon, the auditors no longer fit into Bella's minuscule apartment. Other venues were sought and used — with and without permission: classrooms in elementary schools, empty study halls in the university's law department, the chemistry building, the humanities building, the Institute for the Petrochemical and Natural Gas Industry. In 1979, the second year of the Jewish People's University's operation, about 90 students attended its classes. Bella did everything, organizing the meetings, calling the students to inform them of the schedule and venue, even distributing tea and homemade sandwiches during the breaks between the lectures. One important and risky undertaking that she organized was the samizdat-style preparation, typing, and distribution of lecture notes. At first they were typed and re-typed using carbon copies, equations being inserted by hand. Eventually they were photocopied. Nobody dared ask how and where, since unauthorized duplication was considered a serious crime in the Soviet Union. In 1980, study sessions were increased to twice a week. Saturdays were reserved for three lectures and a seminar.

Even though some of the faculty members and students, especially Senderov, were known dissenters of the Soviet system, any mention of politics was carefully avoided by the teachers at Bella's university. But the enterprise was becoming too successful for the authorities to ignore it. Even though it had no political intent whatsoever, it defied the Soviet system on a grand scale. The Soviet

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[1] There were more. Altogether 21 people taught at the university.

system could not allow an unofficial and independent institution to flourish, thus challenging its sole claim to authority. The mere existence of the Jewish People's University was considered a political act of resistance by the authorities. The end loomed near.

At the beginning of the university's fifth year of operation, Bella was summoned to KGB offices and interrogated. It had been known all along that KGB agents had attended lectures in order to observe the goings-on. They must have known that no subversive activities were carried out at the Jewish People's University. But they never comprehended what kind of institution Bella's university was. The agents just could not grasp that people were willing to teach mathematics without being paid. But one day in the summer of 1982, news came that Senderov, Kanevsky, and a student, Ilya Geltzer, had been arrested.[1] They had distributed leaflets protesting unpaid "volunteer" work that the Communist Party demanded of loyal citizens on the Saturday commemorating Lenin's birthday. Senderov and Kanevsky were known dissenters of the Soviet regime but had always kept mathematics and politics strictly separate. Nevertheless their and the student's affiliation with Bella's enterprise gave the authorities the excuse they sought. Bella was summoned again and asked to serve as a witness against Senderov. Of course, she refused. Her independent spirit would not allow anything but defiance of authority. The tragic consequences occurred a few days later. The bus of Moscow State University's chamber orchestra, where she had played first viola since her student days, took her body to the cemetery. Her ashes were later buried at a different cemetery.

Bella's death spelled the end of the Jewish People's University. Senderov was sentenced on charges of anti-Soviet agitation and propaganda to seven years in prison – where he would spend long stretches in punishment cells sustained by a meager diet that left him too weak to even rise from his bunk.[2] Kanevsky was sentenced to one year and two months in prison. Seminars continued for a few more months due to the valiant efforts of some remaining faculty members, but without Bella's support and guiding hand the spirit was missing. In the spring of 1983 the institution finally closed its non-existent doors. During the four years of its operation, the "Jewish People's University" had instructed about 350 alumni in higher mathematics and brought forth about 100 "graduates," some of whom would become professional mathematicians and faculty members at prestigious institutions, mostly in the United States and in Israel. But Bella had given her alumni more than just a math education: in the face of injustice, discrimination, and seemingly insurmountable difficulties, she had given them hope and taught them to fight back.

References

[1] Dmitry B. Fuchs, *Jewish University*, in Shifman [2005].

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[1] Another young man, Vladimir Gershuni, was arrested together with them and later forcibly confined to a mental institution.

[2] He was released by Gorbachev after Perestroika, having spent five years in prison.

[2] Boris Kanevsky and Valery Senderov, *Intellectual Genocide*, second extended edition, 1980, reprinted in Shifman [2005].

[3] Arkady Livshitz, *How the People's University was born*, mimeo, 2007.

[4] Ilya Muchnik, *Bella Abramovna Subbotovskaya*, in Shifman [2005].

[5] Andrei Reznikov, *A few reminiscences about some peculiarities of getting a mathematical education in Moscow in the 80s*, mimeo, 2007.

[6] Lorin Rosenbaum, *Government by torture*, Worldview, April 1975, 21–27.

[7] Mark Saul, *Kerosinka: An episode in the history of Soviet mathematics*, Notices of the AMS, **46** (10), 1217–1220 (1999).

[8] Alexander Shen, *Entrance Examinations to the MekhMat*, Mathematical Intelligencer **16** (4), (1994).

[9] Mikhail Shifman, *Quantum Tunneling: In Memory of M. Marinow*, 2004.
arXiv:quant-ph/0204156

[10] Mikhail Shifman, *You Failed Your Math Test, Comrade Einstein*, World Scientific, 2005.

[11] Katherine Tylevich, *Free Education at the Highest Price*, in Shifman [2005].

[12] Anatoly Vershik, *Admission to the mathematics departments in Russia in the 1970s and 1980s*, Mathematical Intelligencer **16** (4), 4 (1994).

[13] Anatoly Vershik, *Science and totalitarianism*,
Russian original: Zvezda **8**, 181 (1998);
reprinted in Shifman [2005].

[14] Andrei Zelevinsky, *Remembering Bella Abramovna*,
reprinted in Shifman [2005].

Арье Спивак

Письмо в редакцию приложения к газете «Вести» «Окна»

Уважаемый г-н Бар Селла!

Направляю Вам свои личные воспоминания о Белле Субботовской, которая была упомянута в двух выпусках приложения «Окна» (Статья И. Солганик «Еврейский народный университет» в номере от 28.08.96 и статья Е. Соломоновой «Бодались телята с дубом» — 26.12.96). В дополнение к приведённым в этих статьях сведениям о деятельности Еврейского народного университета и участия в ней Беллы я сжато излагаю несколько фактов из её личной жизни, а также ситуацию, предшествовавшую её трагической гибели.

Спивак Арье

Статья в «Окнах» от 3 июля 1997 года

БЕЛЛА

Две статьи о Еврейском народном университете появились в «Окнах», и в обеих в качестве активного и самоотверженнного его организатора упоминается Белла Абрамовна Субботовская, да будет благословенна её память. Довольно подробно описана деятельность университета и участие в ней Беллы. Мне же, будучи её дальним родственником, хотелось бы дополнить сказанное несколькими фактами семейного плана. Кстати, в первой публикации говорилось о том, что не осталось фотографии Беллы. И в самом деле, поскольку она не очень любила фотографироваться, трудно было найти хорошего качества снимок на памятник на месте захоронения урны с её прахом (на Востряковском кладбище в Москве). Пришлось довольствоваться увеличенным снимком с паспорта. Копию этого фото мы приводим. В этой статье неправильно названа мать Беллы, которую в действительности звали Ева Иосифовна, она скончалась в октябре 1995 г.

О том, что Белла была человеком уникальных способностей, говорит сам факт её поступления на мехмат МГУ в середине 50-х годов безо всякой дополнительной (к школьной) подготовки. Ведь отец Беллы погиб на фронте, а мать была инвалидом ещё с юности. Из студенческих лет Беллы помнится эпизод, связанный с поездкой на целину, в Казахстан. Наслушавшись о разных опасностях, подстерегающих там молодых девушек, Белла без колебаний пошла в парикмахерскую и обрила голову наголо и ходила долгое время в головном уборе (вряд ли она знала о том, что что в средние века еврейские девушки перед замужеством поступали аналогично, дабы избавиться от притязаний местных правителей-гоев на право «первой ночи»). В 50-х годах такой шаг мог предпринять далеко не каждый.

Кроме математики, у Беллы было ещё одно призвание в жизни — музыка. Долгие годы (вплоть до своей гибели) она играла в симфоническом

Белла Абрамовна Субботовская. Последняя фотография. 1980 г.

оркестре МГУ на скрипке-альт. Проводить её в последний путь оркестр пришёл в полном составе.

Свободный, независимый нрав Беллы, нежелание (или, скорее, неумение) терпеть малейший намёк на несправедливость часто осложняли ей жизнь. Она не смогла принять даже относительно интеллигентную атмосферу НИИ, где проработала некоторое время, и, столкнувшись с рутинной несправедивостью, ушла оттуда, понимая, что ей как еврейке найти работу в другом НИИ будет архитрудно. А поскольку материальная сторона никогда не была у неё первостепенной, в конце концов она посвятила себя

развитию математических способностей у малолетних вундеркиндов, причём совсем не обязательно из еврейских семей. Помню, как она с восхищением рассказывала о способностях 5-летнего армянского мальчика, который был среди других её подопечных в полусамодеятельном кружке при ЖЭКе. Вела она эту довольно кропотливую работу в большинстве своём на общественных началах, получая массу профессионального и эстетического удовлетворения при практичеки нулевых доходах. В то же время все, кто бывал у неё в гостях, помнят, что двери квартиры (и холодильника) всегда были открыты каждому как в присутствии, так и в отсутствие хозяев. Всегда у них было полно народу, причём зачастую те, которых хозяева если и знали, то очень поверхностно. Щедрое гостеприимство, возможно, было отражением давней традиции в семье деда Беллы, Йосефа, который, будучи глубоко религиозным человеком, постоянно содержал в своё доме несколько бедных евреев. Это часто вспоминали его 6 дочерей, среди которых и мать Беллы — Ева. Впоследствии это сыграло и отрицательную роль, так как к ним очень просто можно было внедрить агента. Так в самое последнее перед трагическими событиями время у них жила весьма подозрительная девица, которая напросилась к ним, поскольку у неё, по её словам, не было денег на жильё, а из общежития Института Культуры, где она училась с дочерью Беллы, Машей, её выгнали. Находясь всё время в доме, она была практически в курсе всех событий, которые там происходили, вплоть до смерти и похорон Беллы.

Трудно сейчас сказать: самой Белле или кому-то из её друзей впервые пришла в голову мысль о восстановлении справедливости в отношении не принятых в МГУ из-за «5-й графы» еврейских парней и девушек, но это так соответствовало её характеру, что она не могла не оказаться в центре этого начинания. И именно поэтому она не смогла не стать объектом повышенного внимания со стороны КГБ. Одна из версий разгрома Еврейского народного университета была связана с прибытием из Киева в Москву на должность главы КГБ (вместо ушедшего на повышение Андропова) генерала Федорчука, сын которого, будучи математиком, подвергся обструкции со стороны зарубежных коллег с подачи активистов университета (скорее всего Сендерова). Круг начал замыкаться. Начались допросы. Помню, как у Беллы впервые появилось желание эмигрировать из Союза. Она даже попросила организовать ей вызов из Израиля, но потом отказалась от этой мысли. Помню, как глубокой осенью, за год до гибели, мы бродили с ней по бульвару Старой площади в Москве (кстати, это недалеко как от Центральной синагоги, которую я часто посещал, так и от ЦК и КГБ, которые Белла упомянула в шутку незадолго до её смерти, но об этом ниже). Белла металась в поисках выхода, понимая, что преследования КГБ добром не кончаются. Но ей было очень трудно оставить Россию по причине того, что она была связана с престарелой матерью и дочерью-студенткой, и просто потому, что она принципиально не хотела покидать Россию. Она очень любила Москву, русскую культуру. Не чувствуя себя чужеродным элементом, она лишь стремилась восстановить попранную справедливость. Вместе со своей матерью, которая, с одной стороны, происходила из религиозной

семьи и после смерти своего отца даже читала за него специальную молитву «кадиш» (ввиду отсутствия сыновей), а с другой стороны — стала одной из первых комсомолок-«рабфаковок», они пытались искать справедливость легальным способом, обращаясь в ЦК, МК, Моссовет и другие инстанции. В большинстве случаев они даже не удостоились ответа.

В семейной жизни у Беллы тоже было много сложностей. Со своим мужем-физиком, Ильёй Мучником, она довольно долго (лет 10-12) жила душа в душу, но потом, по какой-то причине, разошлась, сохранив, правда дружеские отношения. Эти отношения особенно укрепились в самый последний период, когда Илья сопровождал её на допросы на Лубянку. А поскольку допросы длились 5-6 часов подяд, то можно представить, сколько мужества ему надо было проявить, чтобы высидеть это время в приёмной столь «милого» заведения. Правда и то, что он старался «не раздувать» дело после гибели Беллы, но объяснением тому могла служить боязнь за судьбу их дочери, Маши, с которой впоследствии он эмигрировал в Америку. Кстати, день гибели Беллы совпал со служебной командировкой Ильи в Прибалтику. Похоже, что он тоже был постоянно «под колпаком», и, поскольку в последнее время они были всегда вместе, то надо было дождаться его временого отсутствия в Москве.

Я был в числе последних, кто видел Беллу живой. Было семейное торжество — день рождения одной из пяти сестёр её матери. Белла несколько раз уходила на кухню и, закрыв за собой дверь, подолгу говорила с кем-то по телефону. Мне она сказала, что поедет вечером к своей матери, но по дороге должна с кем-то встретиться на Курском вокзале. В тот вечер (как и несколько раз до того) мы беседовали с ней о её делах. С моей точки зрения всё, что они делали в поисках справедливости, выглядело очень эффектно, но скоре всего напоминало борьбу с ветряной мельницей, сколь безвариантной в смысле шанса на успех, столь же опасной. Но она до последнего верила в свою правоту. Когда Белла уходила, то, вызвав лифт, она вернулась и спросила меня, знаю ли я, чем отличается ЧК от ЦК. И сама ответила: «В ЦК — „цыкают“, а в ЧК — „чикают“.» И грустно улыбнувшись, добавила: «Правда прелесть?» С этой улыбкой она и осталась в моей памяти. А потом мне довелось опознавать её труп, видеть её в растерзанном виде. . .

Где-то во 2-м часу ночи позвонила мать Беллы и сказала, что, несмотря на её мольбы, Белла ушла от неё, пообещав перезвонить по приезде домой, как она это обычно делала, и не позвонила. Сердце матери подсказывало, что случилось самое страшное. «Белла погибла», – она сказала в трубку несколько раз. В морге нам отказались вернуть личные вещи Беллы, среди которых были документы и записные книжки, сославшись на запрет милиции. Книжки эти не вернули и потом.

Когда вечером труп Беллы привезли на её квартиру в Черёмушках, голова была тщательно загримирована, чтобы не было видно страшной раны. Всю ночь я просидел возле Беллы, читая Псалмы у зажжённой свечи. Ранним утром стали собираться десятки людей. Неожиданно пришёл сосед по дому, водитель такси, который сообщил матери подробности происшествия,

свидетелем которого он якобы был. Поскольку он наотрез отказался передать свой рассказ милиции, осталось неясным, по собственной ли воле он всё это рассказал или по чьему-то заданию, чтобы посеять дополнительный страх среди пришедших на похороны. Во всяком случае, место происшествия – Нагатинское шоссе (недалеко от Сумского проезда, где жила мать Беллы) – совпало с официальной версией милиции. Но дальше версии отличались диаметрально. По словам таксиста, Белла переходила дорогу на чётко обозначенном светофором перекрёстке на зелёный свет в то время, как, кроме его такси, перед светофором стояла чёрная «Волга». Как только Белла оказалась у середины перекрёстка (50-метрового в ширину) шоссе, «Волга» (очевидно, с форсированым двигателем) резко рванулась с места в её сторону, не оставив ей никакого шанса увернуться от столкновения. Таксист называл это просто убийством. По данным следователя с Петровки, 38, на шоссе в то время находилось три свидетеля (в точности столько, сколько необходимо по закону), оказавшихся на автобусной остановке в 1-м часу ночи(!). Они в один голос утверждали, что Белла пошла на красный свет и попала под колёса машины, которая даже пыталась от неё увернуться. И это всё на пустынном шоссе! Единственно, что совпадало, – цвет и марка машины – чёрная «Волга». В семье было известно, что при очень смелом, бескомпромиссном характере с детства Белла очень опасалась переходить улицу и решалась на это, лишь убедившись многократно в абсолютной безопасности. Видимо, она предчувствовала свою судьбу. О настроении следователя с Петровки свидетельствует одна маленькая, но характерная деталь: во время разговора с престарелой матерью он настойчиво называл сопровождавшую её племянницу именем-отчеством покойной, как бы намекая на возможные последствия, если та будет излишне вдаваться в подробности.

Провожали Беллу в последний путь десятки людей, сам приход которых свидетельствовал как о большой её популярности, так и о мужестве этих людей, которые в открытую говорили о подлинной причине её смерти. Среди провожавших сновали молодые люди казённого вида, которые без стеснения демонстрировали любопытство к присутствующим, к тому, что они говорили между собой. Когда провожавшие сели в автобусы и процессия двинулась в сторону крематория (куда я, будучи религиозным человеком, не мог поехать), я увидел, как эти молодые люди и девицы вскочили в появившуюся откуда-то «Волгу» и двинулись вслед за автобусами. Всё это было менее чем за месяц до смерти Брежнева.

September 24, 2008

Mark Sapir m.sapir@vanderbilt.edu

Dear Misha,

I looked at your book again and noticed a problem that still does not have solution and which you also mentioned in Haifa: find a function $f : R \to R$ such that

$$f(f(x)) = x^2 - 2 \,.$$

Together with Victor Guba, we proved that this equation has NO continuous solutions.

Here is the proof that a continuous solution does not exist.

1. Suppose that $a \neq b$ but $f(a) = f(b)$. Then

$$f(f(a)) = f(f(b)) \,,$$

so

$$a^2 - 2 = b^2 - 2, \quad a^2 = b^2 \,,$$

so $a = \pm b$.

2. Suppose that $f(-a) = x$. Then $f(x) = (-a)^2 - 2 = a^2 - 2 = f(f(a))$. So from 1,

$$f(-a) = \pm f(a).$$

3. Suppose that $f(x) = x$. Then $f(x) = x^2 - 2 = x$, so $x = 2$ or $x = -1$.

4. Suppose that $f(2) = 2$. Let $a = f(0)$. Then $f(a) = 0^2 - 2 = -2$. So

$$f(-2) = a^2 - 2 = \pm 2.$$

Note that $f(-2) \neq -2$ by 3. So $a^2 - 2 = 2$, whence $a = \pm 2$. By 1 and by the assumption, $f(0) \neq 2$. Hence $f(0) = -2$. Then $f(-2) = 0^2 - 2 = -2$, a contradiction with 3. Thus $f(2) \neq 2$.

5. Let $f(2) = a$. Then $f(a) = 2^2 - 2 = 2$. Hence

$$f(2) = f(f(a)) = a^2 - 2 = a,$$

so $a = -1$. Then $f(-1) = 2$. Let $f(0) = b$. Then

$$f(b) = -2, f(-2) = b^2 - 2 = \pm 1$$

(by 2.). Let $f(-2) = -1$, then

$$b^2 = 1, \quad b = \pm 1.$$

By step 1, only $b = 1$ is possible. So $f(0) = 1$. Consider the intervals $[-2, -1]$ and $[-1, 0]$. By the intermediate value theorem (for continuous functions), f

takes all values from the interval $[1, 2]$ on both $[-2, -1]$ and $[-1, 0]$. This contradicts 1. Hence $f(-2) = 1$. Then

$$b^2 - 2 = 1, \ \ b = \pm\sqrt{3}\,.$$

Thus, $f(0) = \pm\sqrt{3}$.

6. Consider again the intervals $[-2, -1]$ and $[-1, 0]$. On the first interval, f takes all values from $[1, 2]$. On the second interval it takes all values from

$$b = \pm\sqrt{(3)} < 2$$

to 2. By step 1, this is impossible.

$\star\,\star\,\star$ QED.

Non-continuous solutions exist (and infinitely many of them) but one needs the Axiom of Choice to find it.

Best regards,

Mark Sapir

April 14, 2010

Roman Feldman rfeldman@dtcc.com

Dear Sir,

A friend gave me a CD with the sad and so familiar stories from the recent past of our former country and a collection of math problems. The first problem caught my attention because of its simple formulation but quite difficult solutions. I think a solution that I found is short and simple. If it is of any interest to you I'd be glad to hear from you.

April 15, 2010

Dear Mikhail,

Thank you for such a warm answer. I did mean the book "You just failed your math test, comrade Einstein" as you said. I am not a professional mathematician or physicist and anti-Semitism was one of the reasons that instead I became a computer programmer. Thank you also for the "Epilog". Amazing stories.

Roman Feldman

Solution for problem # 1.
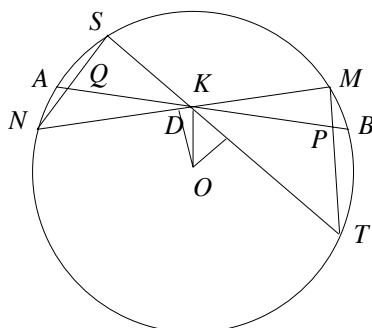
Area of the triangle NSK = area of QKS + area of QKN, or,

$$\frac{1}{2}SK \times NK \times \sin(SKN) = \frac{1}{2}QK \times SK \times \sin(QKS) + (1/2)QK \times KN \times \sin(QKN).$$

Therefore,

$QK = SK \times NK \times \sin(SKN)/[SK \times \sin(QKS) + NK \times \sin(QKN)].$

Similarly,

$PK = MK \times TK \times \sin(MKT)/[MK \times \sin(PKM) + TK \times \sin(PKT)].$

Moreover, $\angle SKN = \angle MKT$ and $\angle QKS = \pi/2 - \angle OKT$ because OK is perpendicular to AB and $\angle QKS = \angle PKT$.

Also

$$QKN = \pi/2 - OKT, \;\; PKM = \pi/2 - \angle OKN \text{ and } PKT = \pi/2 - OKT.$$

Then
$$\sin(QKS) = \cos(OKT), \;\; \sin(QKN) = \cos(OKN).$$

To prove that $|PK| = |QK|$ we have to show that

$$SK \times NK/[SK \times \cos(OKT) + NK \times \cos(QKN)]$$

$$\overset{?}{=} MK \times TK/[MK \times \cos(OKN) + TK \times \cos(OKT)],$$

or,

$$SK \times NK \times MK \times \cos(OKN) + SK \times NK \times TK \times \cos(OKT)$$

$$\overset{?}{=} MK \times TK \times SK \times \cos(OKT) + MK \times TK \times NK \times \cos(OKN)$$

But $SK \times TK = NK \times MK$, therefore

$$SK \times \cos(OKN) + NK \times \cos(OKT) \overset{?}{=} MK \times \cos(OKT) + TK \times \cos(OKN)$$

or

$$(SK - TK) \times \cos(OKN) \overset{?}{=} (MK - NK) \times \cos(OKT).$$

August 4, 2010

Alexander Tumanov tumanov@illinois.edu

Dear Professor Shifman,

Thank you for creating this very interesting an informative book. In particular it was interesting to me, a math professor, to try the problems. I solved all the problems I attempted to solve, but some of them took me several hours. If that system worked in my year 1969, then certainIy I would not be admited to Mekhmat. My last name was Rozenman at that time.

I have a little remark regarding the solution of problem #12. My calculations were not that bad. I make a substitution $y = t^2$ and eliminate x. It reduces to the equation

$$f(t) = 2t^9 - 9t^6 + 27t^3 + 7t - 27 = 0.$$

One needs to see that the only root is $t = 1$. Then a lengthy division that takes only a few minutes yields

$$g(t) = f(t)/(t - 1) = 2t^8 + 2t^7 + 2t^6 - 7t^5 - 7t^4 - 7t^3 + 20t^2 + 20t + 27.$$

Then one easily observes

$$g(t) = (2t^6 - 7t^3 + 20)(t^2 + t + 1) + 7 > 0$$

for all t because the equation

$$2t^6 - 7t^3 + 20 = 2u^2 - 7u + 20 = 0$$

has no real roots.

Best regards,

Shura

Дорогой Миша,

Спасибо за ответ и за Эпилог. Конечно, Вы можете использовать моё письмо.

Я обратил внимание, что в Эпилоге приводится другое решение задачи 12, где автор получил то же самое уравнение, что и я, но решает его сложнее, чем я. В частности, он использует производные, что не относится к школьной математике. Между прочим, подстановка $y = t^2$ в Эпилоге и у меня совершенно очевидна, и пришла бы в голову любому хорошему школьнику. Наоборот, подстановка y=tx из книги навеяна алгебраической геометрией, но в данном случае приводит к вычислениям с большими числами.

Я проверил решение задачи 1 Фельдмана - оно, на мой взгляд, совершенно правильное, хотя совсем простым его не назовёшь. Его трудно читать из-за обилия разных букв и трёхбуквенных обозначений углов. Я заметил опечатку: в строке 11 (считая все непустые строки) $\cos(QKN)$ должно быть $\cos(OKN)$. Я тоже решил эту задачу, но тупым ничего не проясняющим вычислением, а решение Фельдмана содержит внятную идею.

Всего доброго, Шура

March 11, 2012

Alexandre Fedotov <fedotov@mail.desy.de>

Рад, что вам понравилось. Но жаль, что угробил уйму времени. Кроме того, как я уже говорил, это – не решение, а ряд удачных отгадок. На уравнение $f(f(x)) = x^2$ мое внимание обратили вы упоминанием об асимптотике $x^{\sqrt{2}}$ – я ее до этого не "видел хотя "возился"уже долго. Замена переменных – красиво, но для физика менять систему отсчета – совершенно естественно. После этого я безуспешно игрался с уравнением $g^2(y) - 2 = g(y^2)$ много часов и решил: все, хватит тратить время впустую. На другой день зачем-то вернулся и вдруг случайно наткнулся на одно единственное решение (не самое простое: $\sqrt{y} + \sqrt{-y}$), с ним прошел до конца, послал вам сообщение, и только позже, опять же случайно, обнаружил остальной континуум решений. Вот так это было. А вообще-то мое участие в вашей задаче – отголосок моего околомехматовского математического детства в 7-й школе.

March 10, 2012

Mark Sapir m.sapir@vanderbilt.edu

Dear Misha,

Дорогой Миша,

ОК. Полное решение функционального уравнения $f(f(x)) = x^2$ (оно связано со специальными функциями) было в ru_math.livejournal.com, предложено Федором Петровым из Ст. Петербурга (user@rus). Если нужно, я могу его попросить прислать решение.

March 11, 2012

Mark Sapir m.sapir@vanderbilt.edu

Dear Misha,

Петров пока не ответил. Но вот две статьи, где решения найдены:
http://creativemachines.cornell.edu/sites/default/files/lbp132-schmidt.pdf
and

Brown, Becky A.(1-NRL); Brown, A. Ray; Shlesinger, Michael F.(1-ONR) Solutions of doubly and higher order iterated equations. (English summary)

Special issue in honor of Michael E. Fisher's 70th birthday (Piscataway, NJ, 2001). J. Statist. Phys. 110 (2003), no. 3-6, 1087-1097.

Всего хорошего,

Марк

March 12, 2012

Mark Sapir m.sapir@vanderbilt.edu

Вот ответ и решение Фёдора Петрова:

Идея в том, что многочлены Чебышева удовлетворяют равенству

$$T_{nk}(x) = T_n(T_k(x)).$$

Так что если мы положим $n = k = \sqrt{(2)}$, то будет

$$f(f(x)) = T_2(x) = x^2 - 2$$

(мы нормируем многочлены Чебышева так, что

$$T_n(2\cos(x)) = 2\cos(nx)).$$

Осталось понять, что за функция такая $T_{\sqrt{2}}(x)$. Точнее, как эта функция раскладывается в ряд в окрестности 2.

Для этого мы напишем формулу для обычных многочленов Чебышева

$$T_k(2 + t) = \sum c(m,k)t^m,$$

а потом подставим $k = \sqrt{2}$.

Выражения для $c(m,k)$ дается формулой

$$\frac{2k}{k+m}\text{binomial}\{k+m\}\{2m\}.$$

======

Мой комментарий: binomial$\{k+m\}\{2m\}$ для нецелых k записывается с помощью Γ функции.

Марк Сапгир

Alexandre Fedotov <fedotov@mail.desy.de>

Любопытно, что наша функция

$$f(x) = [x/2 + \sqrt{(x/2)^2 - 1}]^{\sqrt{2}} + [x/2 - \sqrt{((x/2)^2 - 1)}]^{\sqrt{2}},$$

найденнная для $x \geq 2$, также однозначно определена и действительна в интервале $|x| \leq 2$ и в нем же принимает значения, что делает возможным вычисление $f(f(x))$. А самое главное, она удовлетворяет исходному уравнению и в дополнительной области с нетривиальной нижней границей

$$2\cos(\pi/\sqrt{2}) \approx -1.211 \leq x \leq 2.$$

Явный вид:

$$
\begin{aligned}
f(x) &= [x/2 + i \times \sqrt{1 - (x/2)^2}]^{\sqrt{2}} + \text{c.c.} = \exp[i \times \sqrt{2} \times \arccos(x/2)] + \text{c.c.} \\
&= 2\cos(\sqrt{2} \times \arccos(x/2)), \\
f(2) &= 2.
\end{aligned}
$$

$$(1)$$

Саша

Alexander V. Fedotov

March 9, 2012.

Trying to solve the functional equation $f(f(x)) = x^2 - 2$

Problem: Find $f(x)$ satisfying the functional equation

$$f(f(x)) = x^2 - 2 \tag{1}$$

Answer:

$$f = z + \frac{1}{z}, \qquad z \equiv \left[\left(x \pm \sqrt{x^2 - 4}\right)/2\right]^{\sqrt{2}}. \tag{2}$$

Solution:

First, it is noteworthy that the equation

$$f(f(x)) = x^2 \tag{3}$$

has simple solutions

$$f_0(x) = x^{\pm\sqrt{2}}. \tag{4}$$

One can try to reduce (1) to (2) by changing the variable $x \to y$, with

$$y = \varphi(x). \tag{5}$$

In terms of y, Eq. (1) can be rewritten as

$$f_y\left(f_y(y)\right) = \varphi\left(\varphi_{-1}^2(y) - 2\right), \tag{6}$$

where

$$f_y = \varphi f \varphi_{-1}. \tag{7}$$

Requesting Eq. (2) to hold for f_y gives

$$f_y\left(f_y(y)\right) = \varphi\left(\varphi_{-1}^2(y) - 2\right) = y^2, \tag{8}$$

implying

$$\varphi_{-1}^2(y) - 2 = \varphi_{-1}(y^2) \tag{9}$$

or

$$g^2(y) - 2 = g(y^2). \tag{10}$$

Here we denoted

$$g(y) ==\equiv \varphi_{-1}(y). \tag{11}$$

Now a solution $g(y)$ of the new functional equation (9) will transform a solution (3) of Eq. (2) (more precisely, the solution of the Eq. (7)) into a solution of Eq. (1):

$$f = f_x = \varphi_{-1} f_y \varphi = g f_y g_{-1} = g f_0 g_{-1}. \tag{12}$$

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Looking for solutions of Eq. (9) we make:

Assumption 1: $g(y)$ is defined in the vicinity of $y = 0$;

Assumption 2A: $g(y)$ and its derivatives of all orders are finite at $y = 0$. Then, by comparing the Taylor series expansions for the left- and right-hand sides of Eq. (9), one can conclude that all the derivatives are zeros, i.e. $g(y) = $ const.. The corresponding solutions, $g(y) = -1$ and $g(y) = 2$, are of no interest for us, as these functions are not invertible.

A singularity of $g(y)$ at $y = 0$ is needed.

Assumption 2B:

$g(0) = \infty$.

Assumption 3: $g(y) \approx y^{-\alpha}$ at $y \to 0$ with $\alpha > 0$.

A good guess is

$$g(y) = \frac{1 + y^\alpha}{y^\alpha} = y^\alpha + y^{-\alpha}, \tag{13}$$

which is to be tested as a a solution for any $\alpha \neq 0$.

• Properties:

⋆ defined in the interval $(0, \infty)$;

⋆ has maxima $= \infty$ at $y \to 0$ and $y \to infty$; and one minimum $g(1) = 2$.

⋆ there are **two inverse functions**, both defined in the interval $[2, \infty)$, and taking values in the intervals $(0, 1]$ and $[1, \infty)$ respectively;

• Independently of the α value, all the solutions will give the same result when fed into Eq. (11) Therefore, we can consider the details for just one case of e.g. $\alpha = 1$:

$$g(y) \equiv x = y + \frac{1}{y}, \tag{14}$$

⋆ The two inverse functions are

$$g_1(x) \equiv y = \left(x \pm \sqrt{x^2 - 4}\right)/2 \tag{15}$$

or

$$y = \left[\left(x \pm \sqrt{x^2 - 4}\right)/2\right]^{1/\alpha} \quad \text{for } \alpha \neq 1. \tag{16}$$

Feeding the found solution $g(y)$ into the formula (11)

According to (11) we get $f(x)$, the solution of Eq. (1), in three steps:

1. Taking $g_{-1}(x)$: with Eq. (14), the result is

$$g_1(x) \equiv y = \left(x \pm \sqrt{x^2 - 4}\right)/2 \tag{17}$$

2. Applying one of two functions $f_0(y) = y^{\pm\sqrt{2}}$ to the result of step 1: taking e.g. $f_0(y) = y^{\sqrt{2}}$, gives

$$z(x) = \left[\left(x \pm \sqrt{x^2 - 4}\right)/2\right]^{\sqrt{2}}. \tag{18}$$

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3. Finally, applying the function (13) for the argument resulting from step 2:

$$f(x) = z + \frac{1}{z} \,. \tag{19}$$

Remarks

◇ Due to specific properties of the function $f(x) = z + \frac{1}{z}$ applied at step 3, the result does not depend on which one, out of the two functions $f_0(y) = y^{\pm\sqrt{2}}$, is chosen at step 2;

◇ If the general solution (15) is taken instead of (14), at step 1, then an additional exponential power $1/\alpha$ appears at step 1 and gets propagated to step 2. Then, at step 3, the general formula (15) is applied instead of (14), and this involves the extra α power, which cancels the $1/\alpha$ power. So the result does not change.

◇ The results are identical for the plus and minus signs in the formula used at step 1. Indeed,

$$\left[\left(x + \sqrt{x^2 - 4}\right)/2\right] = \left[\left(x - \sqrt{x^2 - 4}\right)/2\right]^{-1} \,. \tag{20}$$

Therefore, changing plus to minus just exchanges the terms z and $1/z$ at step 3.

Jewish Problems

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October 18, 2011

Abstract

This is a special collection of problems that were given to select applicants during oral entrance exams to the math department of Moscow State University. These problems were designed to prevent Jewish people and other undesirables from getting a passing grade. Among problems that were used by the department to blackball unwanted candidate students, these problems are distinguished by having a simple solution that is difficult to find. Using problems with a simple solution protected the administration from extra complaints and appeals. This collection therefore has mathematical as well as historical value.

1 A personal story of Tanya Khovanova

In the summer of 1975, while I was in a Soviet math camp preparing to compete in the International Math Olympiad on behalf of the Soviet Union, my fellow team members and I were approached for help by Valera Senderov, a math teacher in one of Moscow's best special math schools.

The Mathematics Department of Moscow State University, the most prestigious mathematics school in Russia, was at that time actively trying to keep Jewish students (and other "undesirables") from enrolling in the department. One of the methods they used for doing this was to give the unwanted students a different set of problems on their oral exam. I was told that these problems were carefully designed to have elementary solutions (so that the Department could avoid scandals) that were nearly impossible to find. Any student who failed to answer could easily be rejected, so this system was an effective method of controlling admissions. These kinds of math problems were informally referred to as "Jewish" problems or "coffins". "Coffins" is the literal translation from Russian; they have also been called "killer" problems in English.

1

These problems and their solutions were, of course, kept secret, but Valera Senderov and his friends had managed to collect a list. In 1975, they approached us to solve these problems, so that they could train the Jewish and other students in these mathematical ideas. Our team of the best eight Soviet students, during the month we had the problems, solved only half of them. True, that we had other priorities, but this fact speaks to the difficulty of these problems.

Being young and impressionable, I was shaken by this whole situation. I had had no idea that such blatant discrimination had been going on. In addition to trying to solve them at the time, I kept these problems as my most valuable possession—I still have that teal notebook.

Later, I emigrated to the United States. When I started my own web page, one of the first things I did was to post some of the problems. People sent me more problems, and solutions to the ones I had. It turned out that not all of the coffins even had elementary solutions: some were intentionally ambiguous questions, some were just plain hard, some had impossible premises. This article is a selection from my collection; we picked out some choice problems that do contain interesting tricks or ideas.

<div align="right">Tanya Khovanova</div>

2 Introduction

Discrimination against Jewish people at the entrance exams to the most prestigious universities in the USSR is a documented fact, see A. Shen [1] and A. Vershik [4]. Alexander Shen in his article published 25 problems that were given to Jewish applicants. Later Ilan Vardi wrote solutions to all those problems, see I. Vardi's homepage [3]. These and other articles were published later in a book, "You Failed Your Math Test, Comrade Einstein: Adventures and Misadventures of Young Mathematicians, Or Test Your Skills in Almost Recreational Mathematics." [2].

In the present collection we have only one problem that overlaps with the problems that Vardi solved, and we give an easier and more surprising solution.

Now, after thirty years, these problems seem easier. Mostly, this is because the ideas of how to solve these problems have spread and are now a part of the standard set of ideas. Thirty years ago these problems were harder to solve and, in addition, the students were given these problems one after another until they failed one of them, at which point they were given a failing mark.

To give readers an opportunity to try and solve these problems we separated problems, key ideas, and solutions. Section 3 contains 21 problems. In the subsequent Section 4 we give hints or main ideas for the solutions. Finally, Section 5 contains solutions.

3 Problems

Problem 1

Solve the following inequality for positive x:

$$x(8\sqrt{1-x} + \sqrt{1+x}) \leq 11\sqrt{1+x} - 16\sqrt{1-x}. \tag{1}$$

Problem 2

Find all functions $F(x) : \mathbb{R} \to \mathbb{R}$ having the property that for any x_1 and x_2 the following inequality holds:

$$F(x_1) - F(x_2) \leq (x_1 - x_2)^2. \tag{2}$$

Problem 3

Given a triangle ABC, construct, using straightedge and compass, a point K on AB and a point M on BC, such that

$$AK = KM = MC. \tag{3}$$

Problem 4

Solve the following equation for real y:

$$2\sqrt[3]{2y-1} = y^3 + 1. \tag{4}$$

Problem 5

Solve the equation

$$\sin^7 x + \frac{1}{\sin^3 x} = \cos^7 x + \frac{1}{\cos^3 x}. \tag{5}$$

Problem 6

You are given a point M and an angle C in the plane. Using a ruler and a compass, draw a line through the point M which cuts off the angle C a triangle of

    a) a given perimeter p
    b) minimum perimeter.

Problem 7

There is a circle in the plane with a drawn diameter. Given a point, draw the perpendicular from the point to the diameter using only a straightedge. Assume the point is neither on the circle nor on the diameter line.

Problem 8

Given an equilateral triangle ABC and a point O inside it, with $\angle BOC = x$ and $\angle AOC = y$, find, in terms of x and y, the angles of the triangle with side lengths equal to AO, BO, and CO.

Problem 9

Two intersecting lines are given on a plane. Find the locus of points A such that the sum of the distances from A to each line is equal to a given number.

Problem 10

A quadrilateral is given in space, such that its edges are tangent to a sphere. Prove that all the points of tangency lie in one plane.

Problem 11

Prove that $\sin 10°$ is irrational.

Problem 12

Can you put six points on the plane, so that the distance between any two of them is an integer, and no three are collinear?

Problem 13

Is it possible to put an equilateral triangle onto a square grid so that all the vertices are in corners?

Problem 14

Reconstruct the quadrilateral $ABCD$ given the lengths of its sides (in order) and the length of the midline between the first and third sides (namely, all the segments drawn in Figure 1).

Problem 15

Find the quadrilateral with the largest area given the lengths of its four sides (in order).

Problem 16

You are given two parallel segments. Using a straightedge, divide one of them into six equal parts.
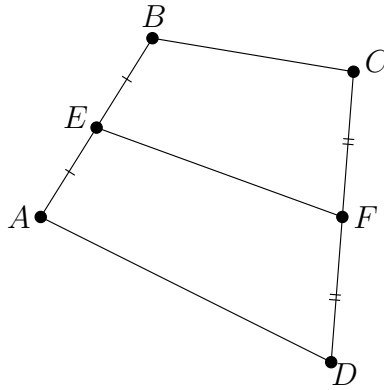
Figure 1: Problem 14: Reconstruct this picture with ruler and compass, given only the lengths $|AB|, |BC|, |CD|, |DA|, |EF|$.

Problem 17

What's larger, $\log_2 3$ or $\log_3 5$?

Problem 18

How many digits does the number 125^{100} have?

Problem 19

Get rid of the radicals in the denominator of:

$$\frac{1}{\sqrt[3]{a} + \sqrt[3]{b} + \sqrt[3]{c}}.$$

Problem 20

Construct (with ruler and compass) a square given one point from each side.

Problem 21

The graph of a monotonically increasing function is cut off with two horizontal lines. Find a point on the graph between intersections such that the sum of the two areas bounded by the lines, the graph and the vertical line through this point is minimum. See Figure 2.
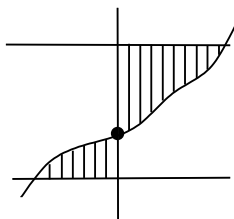
Figure 2: Problem 21: Given the graph, find the point that minimizes the depicted area.

4 Ideas

Idea for problem 1

Substitute

$$y = \frac{\sqrt{1-x}}{\sqrt{1+x}}. \tag{6}$$

Idea for problem 2

Use derivatives.

Idea for problem 3

Construct a triangle $A'B'C$ similar to ABC around points K' and M' so that the desired property holds for it.

Idea for problem 4

Define

$$x = (y^3 + 1)/2.$$

Idea for problem 5

$\cos^{2k+1} x - \sin^{2k+1} x = (\cos x - \sin x)P(\sin x \cos x)$, where P is a polynomial.

Idea for problem 6

Inscribe a circle into the angle C.

Idea for problem 7

See Figure 3.
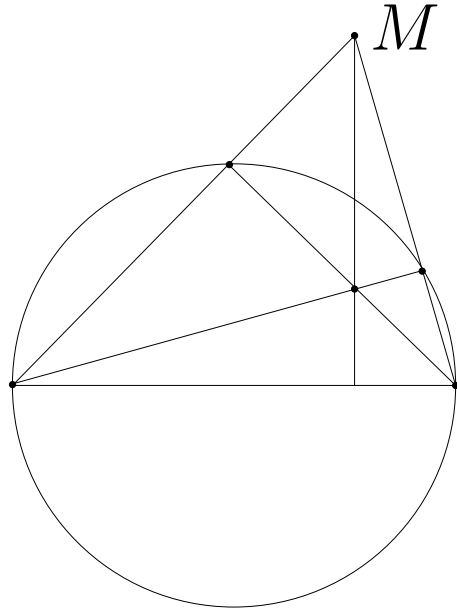
Figure 3: Idea for Problem 7.

Idea for problem 8

Rotate the picture by $60°$ about A. Let the image of O be O'. Then the triangle COO' (or the triangle BOO' if we rotate in the other direction) will be the desired one. See Figure 4.

Idea for problem 9

In an isosceles triangle the sum of the distances from any point on the base to the two other sides is fixed.

Idea for problem 10

Use gravity.

Idea for problem 11

Express $\sin 10°$ through $\sin 30°$.

Idea for problem 12

A Pythagorean triangle generates three such points. Various reflections of it can increase the number of points.
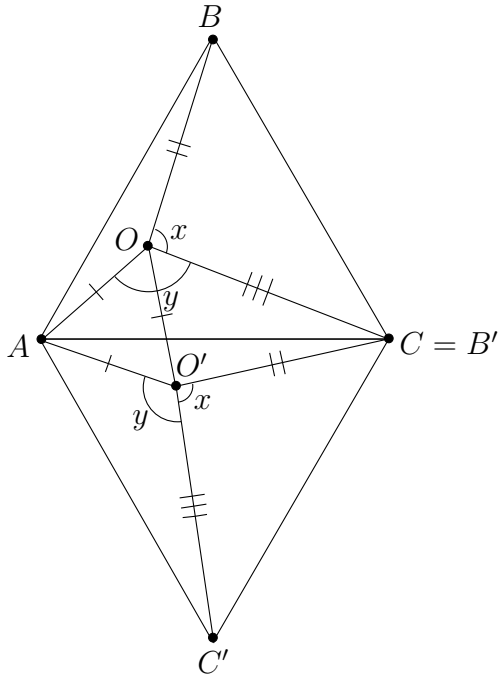
Figure 4: Rotation for Problem 8.

Idea for problem 13

Use parity considerations or the fact that $\tan 60°$ is irrational.

Idea for problem 14

Consider the parallel translation of the sides AD and BC so that A' and B' are at E, shown in Figure 5. The midline will become the median of the new triangle $EC'D'$.

Idea for problem 15

It's the cyclic quadrilateral.

Idea for problem 16

The construction can be separated into two tasks: divide a segment into two equal parts, and divide a segment into six equal parts if six equal segments on a parallel line are given.
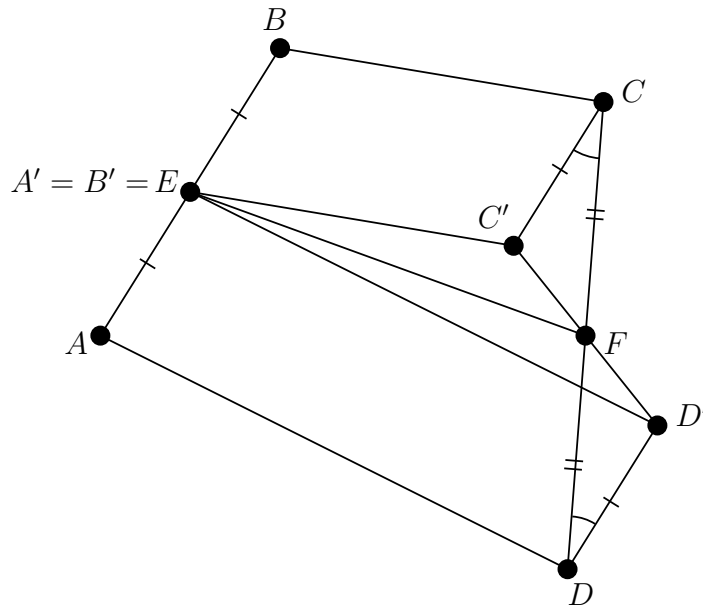
Figure 5: Parallel translations for Problem 14.

Idea for problem 17

Compare both values to $3/2$.

Idea for problem 18

Use the fact that $2^{10} = 1024$, which is close to 10^3.

Idea for problem 19

Use complex numbers.

Idea for problem 20

Cut two parallel lines at a given distance by another line at a given angle. The length of the cut out segment is fixed.

Idea for problem 21

The point on the middle line in between the two lines should work.

5 Solutions

Solution to problem 1

First, observe that for $x > 1$, the terms in (1) become undefined. Next, define y per the idea (6):

$$y = \frac{\sqrt{1-x}}{\sqrt{1+x}}.$$

Observe that for permissible values of x, we have

$$0 \leq y \leq 1,$$

and y is monotonically decreasing in x. Observe also that

$$x = \frac{1-y^2}{1+y^2}.$$

Given the above preliminaries, our inequality transforms as follows:

$$
\begin{aligned}
x(8\sqrt{1-x} + \sqrt{1+x}) &\leq 11\sqrt{1+x} - 16\sqrt{1-x} \\
x\left(8\frac{\sqrt{1-x}}{\sqrt{1+x}} + 1\right) &\leq 11 - 16\frac{\sqrt{1-x}}{\sqrt{1+x}} \\
\frac{1-y^2}{1+y^2}(8y+1) &\leq 11 - 16y \\
(1-y^2)(8y+1) &\leq (1+y^2)(11-16y) \\
-8y^3 - y^2 + 8y + 1 &\leq -16y^3 + 11y^2 - 16y + 11 \\
-8y^3 + 12y^2 - 24y + 10 &\geq 0 \\
(2y-1)(-4y^2 + 4y - 10) &\geq 0.
\end{aligned}
$$

Now, $-4y^2 + 4y - 10$ is always negative, so our monstrous inequality reduces, in the end, to the humble

$$2y - 1 \leq 0.$$

Invoking the monotonicity of y in x and the fact that

$$\frac{1 - (1/2)^2}{1 + (1/2)^2} = \frac{3}{5},$$

our final answer is

$$\frac{3}{5} \leq x \leq 1.$$

Solution to problem 2

Inequality (2) implies

$$\frac{F(x_1) - F(x_2)}{|x_1 - x_2|} \leq |x_1 - x_2|,$$

so the derivative of F at any point x_2 exists and is equal to zero. Therefore, by the fundamental theorem of calculus, the constant functions are exactly the functions with the desired property.
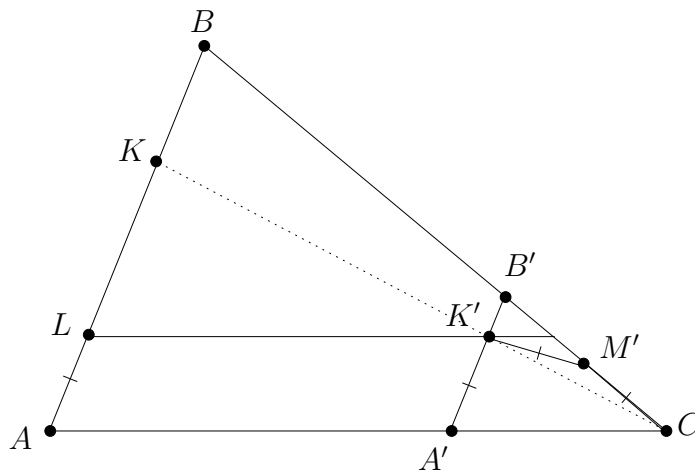
Solution to problem 3

Figure 6: Construction for Problem 3, in the order M', L, K', K.

Pick a point M' anywhere on BC. Construct L on AB such that

$$AL = CM'.$$

Now we want to parallel translate AL so that its image will satisfy (3) with CM'. To do this, construct through L a line parallel to AC, and on it construct the point K' such that

$$K'M' = CM'.$$

Construct through K' a line parallel to AB, and let it intersect the angle ACB at points A' and B'. Then the triangle $A'B'C$ and the points K' and M' satisfy (3), and $A'B'C$ is similar to ABC. Perform a homothety (also called a dilation) about C and you're done. Figure 6 illustrates.

Solution to problem 4

Define

$$x = (y^3 + 1)/2.$$

Then (4) becomes

$$y = (x^3 + 1)/2.$$

Since x and y are given by the same function g of each other, and g is monotonically increasing, we can conclude

$$x = y.$$

The equation is now a standard high-school cubic

$$y^3 - 2y + 1 = 0,$$

solvable by the method of guessing a small integer root and factoring. Indeed,

$$y = 1$$

is a root, and the factor $y^2 + y - 1$ yields two more roots

$$y = \frac{-1 \pm \sqrt{5}}{2}.$$

Solution to problem 5

First, rearrange (5) into

$$\frac{1}{\sin^3 x} - \frac{1}{\cos^3 x} = \cos^7 x - \sin^7 x$$

$$\frac{\cos^3 x - \sin^3 x}{\cos^3 x \sin^3 x} = \cos^7 x - \sin^7 x.$$

Now there are two cases:

Case 1, $\cos x - \sin x = 0$:

Then

$$x = \frac{\pi}{4} \quad \text{or} \quad x = \pi + \frac{\pi}{4}.$$

Case 2, otherwise:

We can cancel $\cos x - \sin x$, and get

$$\frac{\cos^2 x + \cos x \sin x + \sin^2 x}{\cos^3 x \sin^3 x} =$$
$$\cos^6 x + \cos^5 x \sin x + \cos^4 x \sin^2 x + \cos^3 x \sin^3 x +$$
$$\cos^2 x \sin^4 x + \cos x \sin^5 x + \sin^6 x. \qquad (7)$$

Substituting

$$t = \cos x \sin x,$$

we find that

$$\cos^4 x + \sin^4 x = (\cos^2 x + \sin^2 x)^2 - 2 \cos^2 x \sin^2 x$$
$$= 1 - 2t^2$$

and that

$$\cos^6 x + \sin^6 x = (\cos^2 x + \sin^2 x)(\cos^4 x - \cos^2 x \sin^2 x + \sin^4 x)$$
$$= 1 - 3t^2$$

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so (7) reduces to

$$\frac{1+t}{t^3} = 1 - 3t^2 + t(1-2t^2) + t^2 + t^3 = 1 + t - 2t^2 - t^3$$

$$0 = -t^6 - 2t^5 + t^4 + t^3 - t - 1.$$

But

$$|t| = \left|\frac{\sin 2x}{2}\right| \le \frac{1}{2},$$

so

$$|-t^6 - 2t^5 + t^4 + t^3 - t| \le \frac{1}{64} + \frac{1}{16} + \frac{1}{16} + \frac{1}{8} + \frac{1}{2} < 1.$$

Therefore, there are no solutions in this case.

Solution to problem 6

a) The point M must be outside the angle opposite to C. Construct points A and B on the angle such that

$$\frac{p}{2} = CA = CB.$$

Then inscribe a circle into the angle tangent at those two points, and draw a tangent from M to that circle. The resulting triangle has the desired perimeter. This construction is illustrated in Figure 7.
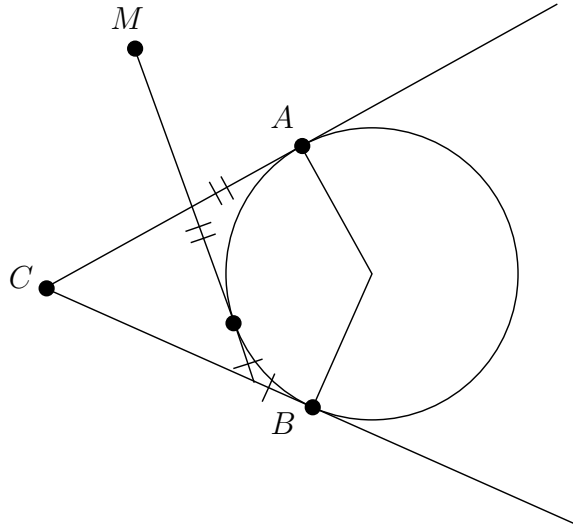
Figure 7: Construction for Problem 6a.

b) If M is outside the angle, the minimum perimeter is 0. If it is inside, then draw a circle through M away from C that is tangent to the angle, and take a

tangent to it as in part a. It is not hard to see from Figure 7 that the resulting triangle has minimum perimeter.

Solution to problem 7

The end points of the diameter and M form a triangle in which we need to draw a height, see Figure 3. The height passes through the orthocenter, which is easy to construct as the bases of the other two heights lie on the circle. If M is inside the circle, the construction is the same.

Solution to problem 8

The situation is represented in Figure 4. The points B, C, and O go to the points B', C', and O', respectively, under rotation about A by $60°$. The marked equalities follow by the properties of rotation. The desired triangle is then COO'. The angles in question are

$$
\begin{aligned}
O'OC &= y - 60°, \\
OO'C &= 300° - x - y, \\
OCO' &= 180° - (y - 60°) - (300° - x - y) \\
&= x - 60°.
\end{aligned}
$$

Solution to problem 9

In Figure 8, the sum of the areas of the two triangles ABD and CBD equals the area of the triangle ABC. Canceling the length of the side $BC(= AB)$, the sum of the heights from point D equals the height from point A (and the height from point C).

Therefore, the locus is a rectangle whose vertices are the four points that are each on one of the lines and at the desired distance from the other: Figure 9.

Solution to problem 10

Place masses at the vertices of the quadrilateral such that the center of mass of each edge falls onto a point of tangency. One way to do this is to place, at each vertex, a mass equal to 1 over the distance from that the vertex to each point of tangency of the edges that vertex is on (the two distances must be equal). Then the center of mass of the whole arrangement will have to be on each line connecting pairs of opposite points of tangency. Therefore, these lines intersect, and all four points of tangency are in one plane, as desired.

Solution to problem 11

Observe that

$$
\begin{aligned}
1/2 = \sin 30° &= 3 \sin 10° - 4 \sin^3 10° \tag{8} \\
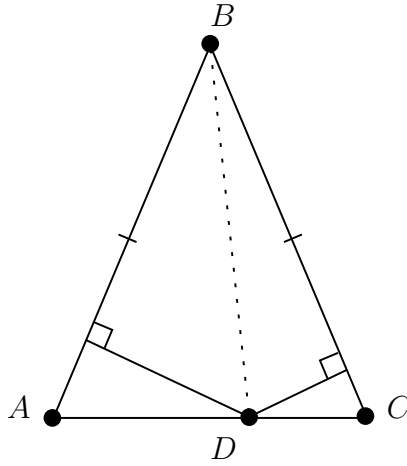0 &= 8 \sin^3 10° - 6 \sin 10° + 1, \tag{9}
\end{aligned}
$$

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Figure 8: One quadrant for Problem 9. $|BC| = |AB|$, so the sum of the heights from D is independent of the position of D on AC.
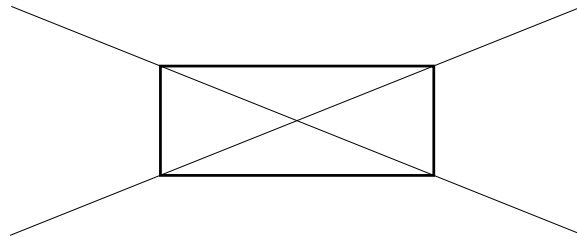

Figure 9: Answer to Problem 9: locus of points with fixed total distance from two given lines.

where (8) holds by repeated application of the sine and cosine angle sum formulae. Let

$$x = 2\sin 10°.$$

Then (9) reduces to

$$x^3 - 3x + 1 = 0.$$

All rational roots of this must be integers and divide the constant term. Since ± 1 do not work, all roots must be irrational.

Solution to problem 12

If we take a right triangle ABC with integer sides, the area will be rational. Therefore, the height onto the hypotenuse AC will be rational. This means that

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if we reflect this triangle about the hypotenuse, we will have four points in the plane all at rational distances from each other.

Now, let the base of that height be at point D. Then, since the triangle ABC is similar to the triangle BDC, the distances AD and CD will both be rational. Therefore, reflecting the whole thing about the perpendicular bisector of AC yields two more points, so that all six are at rational distances from each other. All that's left now is to expand by a multiplicative factor that clears all the denominators.

Start with the 3, 4, 5 Pythagorean triangle, lay the hypotenuse along the x axis, with the center at the origin, perform the above construction, and scale by 10 to clear denominators. Six such points are:

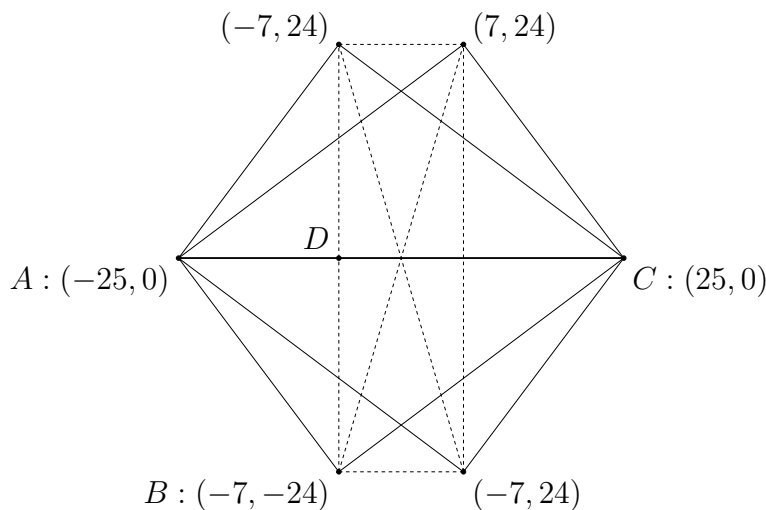$$(\pm 25, 0), \ (\pm 7, \pm 24).$$

Figure 10: Answer to Problem 12. The six needed points have the given co-ordinates, and the points mentioned in the text are labeled. The solid lines have integral lengths by construction, being images under reflection of the initial Pythagorean triangle. The dashed lines have lengths that must be proven or verified to be integral.

Solution to problem 13

Suppose one of the vertices is at the origin. Suppose the coordinates of the two other vertices are (a, b) and (c, d). If all the numbers are divisible by two, we can reduce the triangle by half. Thus, we can assume that one of the numbers is not divisible by 2. Suppose a is odd.

If b is odd, then $a^2 + b^2$ is of the form $4k + 2$. As $a^2 + b^2 = c^2 + d^2$ we must conclude that both c and d are odd. But the square of the length of the

third side is $(a - c)^2 + (b - d)^2$, which is divisible by 4. So the triangle can't be equilateral.

If b is even, then $a^2 + b^2$ is of the form $4k + 1$. As $a^2 + b^2 = c^2 + d^2$ we must conclude that c and d have different parity. Hence, $a - c$ and $b - d$ have the same parity and, correspondingly, the square of the length of the third side is again even. Contradiction.

For another solution, observe that the angle any segment between two grid vertices makes with either axis has to have a rational tangent. In addition, as

$$\tan(\alpha + \beta) = \frac{\tan \alpha + \tan \beta}{1 - \tan \alpha \tan \beta},$$

the tangent of the sum (or difference) of two angles with rational tangents is rational. Therefore any non-right angle given by grid points has rational tangent. Since $\tan 60° = \sqrt{3}$ is irrational, the equilateral triangle cannot have all three vertices on a square grid.

Solution to problem 14

Consider the parallel translation of the sides AD and BC so that A' and B' are at E, shown in Figure 5. Then the triangles $CC'F$ and $DD'F$ are equal, because they have two equal sides with an equal angle between them. Therefore, F is the median of the triangle $EC'D'$. We can reconstruct a triangle from the lengths of its two sides and the median between them,[1] which gives us the angle the original sides AD and BC made with each other.

The reconstruction of that triangle is equal to the triangle $AC''D$ in Figure 11, where AC'' is the parallel translation of BC so that B'' is at A. But we are given the distance between C and D and between C and C'', so we can find C by constructing the intersection of two circles. Constructing B is easy.

Solution to problem 15

Take the cyclic quadrilateral with the given sides and inscribe it into a circle. Consider the parts of the circle between the circumference and the quadrilateral as firmly attached to the sides. Consider a different quadrilateral with the given sides and the same parts attached to it shown in gray in Figure 12. The new figure will have the same perimeter as the perimeter of the circle, hence necessarily lesser area. Since the attached parts have fixed area, the quadrilateral must have lesser area as well.

Solution to problem 16

Given a segment and a parallel line we can always divide the segment into two equal parts. Take two points on the parallel line. Together with the ends of the

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[1] Because we can reconstruct the parallelogram whose sides are the given sides and one of whose diagonals has twice the length of the given median.
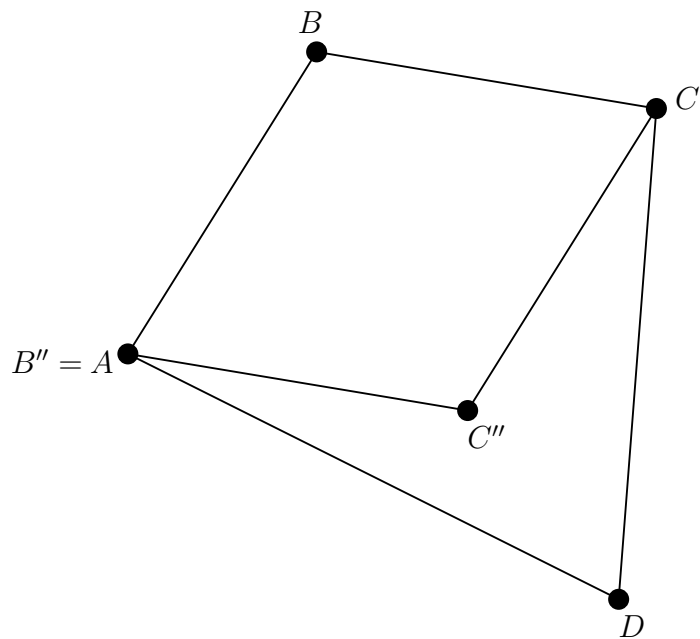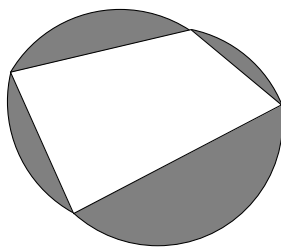
Figure 11: Completion of Problem 14.

Figure 12: A quadrilateral with attached parts, per the argument for Problem 15.

segment the points form a trapezoid. Continue the sides to form a triangle. The segment passing through the third vertex of the triangle and the intersection of the diagonals of the trapezoid divides both parallel segments into two equal parts.

Using the division method above, divide one of the segments into eight equal parts. Pick six of these parts consecutively. Then perform a homothety mapping their union onto the other segment. The center of the homothety is the intersection of the other sides of the trapezoid formed by the six segments and the target segment. See Figure 13.
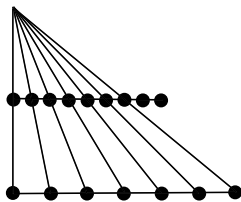

Figure 13: The homothety for Problem 16.

Solution to problem 17

We will compare $\log_2 3$ and $\log_3 5$ to $3/2$, both by the method of applying the same monotonic functions to both sides until we get something known.

First, compare $\log_2 3$ and $3/2$. The functions 2^x and x^2 are monotonic (at least for positive x), so we can use the composition of them to remove ugly pieces from our numbers:

$$\left(2^{\log_2 3}\right)^2 = 3^2 = 9 > 8 = 2^3 = \left(2^{3/2}\right)^2.$$

Second, compare $\log_3 5$ and $3/2$. The functions 3^x and x^2 are monotonic:

$$\left(3^{\log_3 5}\right)^2 = 5^2 = 25 < 27 = 3^3 = \left(3^{3/2}\right)^2.$$

Hence $\log_2 3 > \log_3 5$.

Solution to problem 18

Clearly, $125^{100} = 10^{300}/2^{300}$. Also, $2^{300} = 1024^{30} = 10^{90} \times 1.024^{30}$. So

$$125^{100} = 10^{210}/1.024^{30}.$$

Let's estimate 1.024^{30}. For any number slightly bigger than 1 we can use the binomial formula: $(1+x)^{30} = 1 + 30x + 435x^2 + \binom{30}{3}x^3 + \dots$. In our case $x < 1/40$. We can estimate each term after 1 as 0.75, 0.27, and 0.06. We see that they are getting smaller very fast. So we know that $1 < 1.024^{30} < 10$, which gives us 210 digits for 125^{100}.

Solution to problem 19

Let $x = \sqrt[3]{a}$, $y = \sqrt[3]{b}$, and $z = \sqrt[3]{c}$. Consider three numbers: 1, w, w^2, where w is a primitive cube root of 1. Consider the nine terms of the form $x + w^i y + w^j z$, where i and j are 0, 1, or 2. If we multiply them we get an expression with all real coefficients, because it is self-conjugate. In addition, replacing y with wy doesn't change the product, so the powers of y present in the result have to be divisible by 3. Analogously, the powers of z have to be divisible by 3. Consequently, as the product is homogeneous, the powers of x have to be divisible by 3.

Thus the resulting product is a polynomial of a, b, and c. Explicitly, if we multiply the denominator and numerator by $(x + wy + w^2 z)(x + w^2 y + wz)(x + y + wz)(x + y + w^2 z)(x + wy + z)(x + w^2 y + z)(x + wy + wz)(x + w^2 y + w^2 z)$, the denominator becomes $(a + b + c)^3 - 27abc$.

We might try to simplify the calculation by initially multiplying the numerator and denominator by $(x + wy + w^2 z)(x + w^2 y + wz) = x^2 + y^2 - yz + z^2 - x(y + z)$. We get

$$\frac{1}{\sqrt[3]{a} + \sqrt[3]{b} + \sqrt[3]{c}} = \frac{\sqrt[3]{a}^2 + \sqrt[3]{b}^2 + \sqrt[3]{c}^2 - \sqrt[3]{ab} - \sqrt[3]{ac} - \sqrt[3]{bc}}{a + b + c - 3\sqrt[3]{abc}}.$$

Now the denominator is of the form $s - \sqrt[3]{t}$ and has only one radical. To get rid of it we can multiply the denominator and the numerator by $s^2 + s\sqrt[3]{t} + \sqrt[3]{t}^2$. The denominator becomes $s^3 - t = (a + b + c)^3 - 27abc$.

Solution to problem 20

Suppose A, B, C and D denote the points on the sides of the square, in order. Connect A and C. Draw a perpendicular from B to the segment AC. Let point D' lie on the perpendicular given that the distance BD' is the same as the length of AC. Then D' belongs to the same side (or extension of the side) of the square as D. See Figure 14. Once we know from DD' how the square is oriented, the rest is easy.
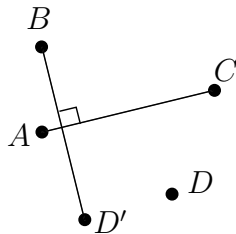

Figure 14: Problem 20: Constructing a square from four given points.

Solution to problem 21

Let A be the point on the function that lies on the middle line between and parallel to the two lines. If we move the cut off point to the right, then the area under the function increases faster than the area over the function decreases. Moving to the left is symmetric.

References

[1] A. Shen, Entrance examinations to the Mekh-mat, Math. Intelligencer, **16**, 2010.

[2] M. Shifman, ed., *You Failed Your Math Test, Comrade Einstein: Adventures and Misadventures of Young Mathematicians, Or Test Your Skills in Almost Recreational Mathematicsm*, World Scientific, 2005.

[3] Ilan Vardi, `http://www.lix.polytechnique.fr/Labo/Ilan.Vardi/`

[4] A. Vershik, Admission to the mathematics faculty in Russia in the 1970s and 1980s, **16**, 2010.

POLITICAL TRIALS IN THE USSR AND KIDS: LATE BREZHNEV ERA & DEATH OF BELLA SUBBOTOVSKAYA-MUCHNIK

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1.   Introduction

According to some leaks of information, the Party[a] decision to restrict the admission of Jews to the most prestigious universities was made in 1969. A lot of important anti-dissident and anti-Jewish decisions were made during this Central Committee meeting. Mathematics was mentioned especially.

Very soon we could see several confirmations of these leaks. My friend Venya Myasnikov was the Scientific Secretary of the mechanics part of mech-mat,[b] its head was Sedov. Venya was a member of the Party. He called me during the fall of 1969 and said the following:

"Now I am officially sick but I know from a friend that a new secret instruction was received by mech-mat's First Department.[c] It says that we should restrict hiring of people whose nationality[d] is dominant in the countries that are enemies of the USSR. I am in the process of hiring a Jew, it is almost done. Only after that I intend to visit the First Department and officially sign in to read this new

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[a]Communist Party of the Soviet Union.
[b]The Department of Mechanics and Mathematics of the Moscow State University and other Soviet universities.
[c]The same as the Regime Department, a KGB-related unit mandatory for all large institutions. "Big Brother" in Orwellian terminology.
[d]In Russian, nationality means ethnic origin.

2   *S.P Novikov*

instruction."

The new Dean of mech-mat was appointed by an order from a very high level. He started to organize math "brigades" to treat Jewish kids trying to enter mech-mat in a special way.

The Rector Petrovskii[e] could do nothing. Very soon he died.

A completely new structure was created. In the past, antisemitic examinations existed, but many smart Jewish kids were capable to overrun them. Besides, antisemitic entrance exams for future mathematicians were either in physics or in literature, not in mathematics. In addition, there was no global organization, everything depended on concrete people.

The new Brezhnev's approach was based on the idea that the community of math students should be created by mathematicians, not by physicists or experts in literature. It is physics which should be decided by physicists. But all people should respect the General Party Line. As a corollary, Jewish kids trying to enter mech-mat were collected in special groups for math exams where the abovementioned brigades acted: special math test problems were given to them.[f] This system was constructed in the early 1970s.

Such brigades were created in all universities. Soon they started to sell their activity for money, of course. Finally, the whole classical system of the entrance examinations died.

There were three people organizing public activities against the discrimination of the Jewish kids in the process of the entrance examinations to mech-mat: Valery Senderov, Boris Kanevski and Bella Subbotovskaya-Muchnik who graduated from mech-mat simultaneously with me and my wife.

Senderov was a leader, he was a math teacher and a devoted revolutionary. He was an organizer. Bella used to be a roommate of my wife in the student dormitories many years ago. She worked on her PhD in the Lupanov[g] and Yablonskii's seminar. So, she had an

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[e]Ivan Georgievich Petrovskii, a well-known mathematician, was the Rector of the Moscow State University from 1951 till his death in 1973.

[f]These killer problems are known in Russian as "coffins."

[g]Oleg Borisovich Lupanov (1932-2006), Academician and the Dean of mech-mat in 1980-2006. Sergei Vsevolodovich Yablonskii (1924 -1998) worked on mathematical cybernetics.

especially strong "complex of guilt" concerning the role of her teacher Yablonskii in the campaign against Jews. Yablonskii was originally a pupil of my late father. His creative abilities were very modest but he had an interesting seminar. His best pupil was Lupanov. There was a number of Jews in his seminar. Bella was one of them. Her results were seriously quoted in his (second) Doctoral Dissertation. No doubt, he was a KGB associate, under the command of Keldysh.[h]

At the same time, several antisemitic impulses were visible in Yablonskii's behavior: he openly hated Gelfand and many others but was careful concerning people in his own area. Keldysh pressed my father to help him to defend his second Doctoral Dissertation as soon as possible saying that he needs to appoint him as the Head of a department. It was done finally in the first half of the 1960s. Unexpectedly, Yablonskii became a terribly aggressive antisemitic activist when he was promoted by Keldysh, after the famous letter defending Esenin-Volpin.[i]

He became a center of antisemitic administrative activity in the math department of Academy.[j] He loved to bite people. Apparently, it gave him a lot of pleasure. It was Yablonskii who managed to attract Pontryagin to this activity. Obviously, the promises from Keldysh played the leading role here. Lupanov became the Dean of mech-mat later, in 1980, promoted by Logunov.[k] He was passive, never loved to bite people and did nothing himself, silently allowing to surrounding antisemites to do their job – until it was canceled by the highest officials in the late Gorbachev era. In 1980-81 he became a center of anti-Jewish intellectual genocide in the eyes of Bella. Bella worked hard organizing an illegal underground university mostly for Jewish kids, attracting the lecturers like Fuchs, Vinogradov, Sossin-

He was the Corresponding Member of the USSR Academy of Sciences.

[h]Mstislav Vsevolodovich Keldysh (1911-1978) was the President of the USSR Academy of Sciences from 1961 till 1975. He was responsible for the development of computational mathematics in the USSR.

[i]Alexander Sergeevich Esenin-Volpin is a mathematician and human rights activist. In the 1950's and 60s he spent 14 years in exile and gulag camps for his dissident activities.

[j]The USSR Academy of Sciences.

[k]Academician Anatolii Alekseevich Logunov was the Rector of the Moscow State University from 1977 till 1992.

ski.[1]

She entered our family as an old friend. It happened about three years before the crucial year of 1981. She told me about this underground teaching activity. I warned her that this activity may have a very-very bad end – not only for her but also for these good mathematicians. All of them were my personal friends. She became fanatically devoted to the revolutionary activity. Her family broke with her. She became a 100% revolutionary. As a cover Bella visited us to teach music (violin) my son Petya.

In the Summer of 1981 the situation became dangerous for us. In particular, Bella wanted to attract everybody to her activity. After the entrance exams to mech-mat my daughter Ira decided to visit the Dean Lupanov, to make a strong protest and decline mech-mat studentship. Somehow I found out of her intention in a proper time and managed to catch her before entering Deans office. My friend Solomon Alber and his son Mark spoke to her, as Mark reminded me recently. They told her that she should not feel herself guilty for the other peoples crimes.

Anyway, we stopped it just before it actually happened. We broke relations with Bella. My wife spoke to Senderov by phone. He personally promised not to advance revolutionary job in my family. But our daughter Ira was unhappy. It was very good that all her Jewish friends entered some reasonably good institutions. However, it was only an introduction.

2. Step 1: The first year: The action of revolutionaries and preparation to the trial

In the August-September 1981 Senderov, Kanevski and Bella made presentations for some western "Voices"[m] about "intellectual genocide" in Soviet mathematics. I forgot which radio it was. After that KGB certainly had all these activities under their surveillance, fol-

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[l]Dmitri Fuchs, currently at UC, Davis; Alexander Vinogradov, currently at Salerno University (Italy); Alexei Sossinski, currently at the Independent Moscow University.
[m]The Voice of America, BBC, Deutsche Welle, and other western radio programs intended for Soviet listeners were collectively referred to as Voices.

lowing every slightest move. I am aware that they infiltrated into this process, they had their people there. Who were they?

The understanding of that happened to be crucial for defending our own kids. Let me remind you that these kids were 17 years old in 1981, no political trial against them was allowed by the Soviet law. KGB worked with the 18 years old people, or older. The whole winter of 1981/82 Luiza Kirillova[n]

actively worked to collect all this group of boys and girls as a posse in her apartment. Now they were students in various institutions. The fall of 1981 and early winter of 1982 were very special. Dictator Brezhnev was very sick.

Let me tell you here what Moscow people spoke of with each other at is time. Brezhnev strongly suspected that everybody around him (especially Andropov) were expecting his imminent death. Kosygin already died. Some Voices said that a KGB investigator mentioned the name of Brezhnevs daughter Galina during the interrogation of a circus actor Tsigan, one of her lovers. Tsigan was arrested for something like smuggling. General Tsvigun whose responsibility was to look after the Brezhnev's children, was completely lost and made an important mistake: he visited Suslov in order to ask him: "What should I do?"

Suslov was terribly scared and told him to go away. He was sick and died very soon. Of course, in such dark dictator-type structures the rules required Tsvigun to speak only to Brezhnev, his master, concerning his family. Anyway, Tsvigun was killed. They officially announced that he committed suicide. Andropov was removed from the position of the KGB Chairman. He was shifted to the position of the Second Party Secretary which is formally higher, but his real base, KGB, was taken away from him. The new KGB Chairman was appointed. It was V. Fedorchuk from Kiev. His war-time illegitimate son, V.V. Fedorchuk, was a mathematician working in mech-mat, an expert in general topology. His biological father was always officially

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[n]Luiza Kirillova was a wife of a well-known Soviet mathematician Alexander Aleksandrovich Kirillov, a student of I.M. Gelfand. At that time he was a math professor at the Moscow State University. Currently at the Department of Mathematics, University of Pennsylvania.

mentioned in his documents. It was allowed until Stalin forbade to do so after 1944, but he was born earlier. The Rector Logunov (who always was our enemy trying to prove that Einstein's general relativity was wrong) wanted to make him a successor of Pavel Aleksandrov,º as the head of the topology group at mech-mat. Aleksandrov was very sick. He wanted me to became his successor.

So, we carefully investigated this situation and found out that Fedorchuk senior does not completely support his bastard son and did not include him in the list of relatives written for Politburo. However, at low levels this official connection could be effectively used sometimes by the Logunov people. Small people dont know whether or not Fedorchuk senior supports his son, Fedorchuk junior.

I was elected as an Academician in December 1981 and thus became a person whom KGB would like to control. There was a big difference between the attention the State paid to the Academicians and other scientists – even the Corresponding Members of the Academy were watched much less than the Academicians. Their phones contained permanently installed listening devices.

Luiza already worked hard for the last 3 years to enhance contacts between our families, but her activity drastically increased in the late 1981. She started to visit Chernogolovka with her family since January 1982, to get my daughter more involved in her "club" of kids. My friend Solomon Alber and I discussed this business in Chernogolovka in the spring, more exactly March-April 1982.

Solomon Alber was very experienced, he had already spent 7 years as a refusenik. Overall, he waited for permission to leave the Soviet Union for13 years. Solomon helped a lot to Natan Sharanski during his trial and after that. Natan attended his burial in the US in 1993.

I spoke to Natan – he was a very interesting personality, and told me, in particular, that there were 18 different regimes of feeding in Soviet prisons, from 1a to 9b, to exert pressure on inmates both physically and psychologically. Solomon pointed out to me that some features in the behavior of Luiza look unnatural. They contradicted

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ºAcademician Pavel Sergeevich Aleksandrov (1896-1982) was a mathematics professor at the Moscow State University and the President of the Moscow Mathematical Society from 1932 till 1964.

to the publicly declared image of that family. I was not experienced enough but decided to be careful. I pressed my daughter to stop visiting Kirillovs where this club regularly gathered. Ira made scandals and was unhappy. However, very soon her opinion changed, and she became very scared.

3.   Step 2. Preparation for the Trial

In the late June of 1982 really dramatic events started. During the half-year period from January to June most kids from that posse became 18 years old, and KGB started their final business. Ilya Geltser was arrested. Some documents were found in his apartment looking as if they were especially designed for the trial. I dont know who gave them to Geltser. Anyway, he was careless. Nina Duduchava was interrogated for several hours. She probably typed Geltser's materials, a typing machine was found by KGB. Both were classmates and friends of my daughter. Mandelshtam was interrogated for 12 hours. We heard later from our friends that Geltser and Mandelshtam were distributing some "anti-Soviet leaflets" (*listovki*) putting them in personal mailboxes.

They both – Geltser and Mandelshtam – were students in the Theoretical Physics Abrikosov Group[p] in the Institute of Steel and Alloys.[q] Mandelshtam's aunt told my wife later that she found, by accident, some anti-Soviet materials in his room at home , a few days before the first arrests and interrogations; she made a scandal and burned them. Therefore, KGB found nothing: they were aware that there is something, indeed, became angry and interrogated him for a very long time, but unsuccessfully.

Senderov was arrested. Kanevski also was arrested a few days later when he returned from a trip, as people told me later. So he was not a KGB informer, as I thought at first. A lot of other kids from this posse were interrogated. My daughter was not summoned to KGB for interrogation. We – I and Solomon – did the right thing

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[p]There is a slight inaccuracy here. Both Geltser and Mandelshtam were sophomores at the time of these events, and were loosely associated with the Theoretical Physics Chair.
[q]Moscow Institute of Steel and Alloys is Russia's primary technological university in the field of steel-making and metallurgy.

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and exactly in time, removing her from all contacts with this club a couple of months prior to the arrests and interrogations started.

Let me tell you a story which looks funny now (but did not look funny at all at that time). In September of 1982 my wife received a letter (*otkrytka*) from KGB ordering her to come to Lubyanka.[r] It was signed by "Colonel Malov."

I was in Chernogolovka. She came to me in tears, showed it and said: "Don't tell about it to anybody."

This kind of reaction of Soviet people was standard.

"No, I am not going to keep silence " – I answered, already prepared, not without help from my friend Solomon. I made the first call to a friend of my late father, a painter V.V. Domogatski.[s] He had roots in the Ukrainian nobility. His family's history could be traced back to the famous Lithuanian princeling Daumantas-Dovmont[t] who was an invited Prince-ruler in the Pskov republic in the late 13 century. He was baptized under the name Timofei and canonized as an orthodox saint for his victories over Germans. V.V. Domogatski was a son of the well-known Russian sculptor V.N. Domogatski whose art is broadly represented in Tretiakovka. I asked his advice.

Several best Russian painters of the younger post-war generation highly respected his opinions in art and considered themselves as his pupils (Birger and Mitlyanski[u] between them). He told me following:

"Boris Birger received such an "invitation," he did not go and was transported to them by brute force, the *militia*. So, there is no choice."

After that I visited Solomon and discussed with him what to do. Solomon's advice was completely different. He told me following:

"Birger is a unique person, a participant of the Stalingrad battle, widely known for his views and by the famous collision of artists with Nikita Khrushchev many years ago. He officially denounced his

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[r]Lubyanka is a popular name for the KGB headquarters and affiliated prison on Lubyanka Square (Dzerzhinsky Square at that time) in Moscow.

[s]Vladimir Vladimirovich Domogatski (1909-1986) was famous for his illustrations for classical Russian literature.

[t]Daumantas or Dovmont (the Christian name Timothy) was a Lithuanian princeling best remembered as a military leader of the Pskov Republic between 1266 and 1299.

[u]Boris Georgievich Birger (1923 - 2001) and Daniel Yudovich Mitlyanski (1924 - 2006).

Party membership after that. He is acknowledged as one of the very best painters in Moscow. Probably there was a very high level order to speak to him. But the case of your wife is different: no known activity. It is simply a provocation against you."

We decided, after some discussion, that KGB probably would like to recruit (*zaverbovat*) me, now an Academician. This would be valuable for them. They successfully did that with a biologist, Academician Baev,[v] getting his daughter involved in an icon-steeling trial – her husband was a priest. Finally, Baev became their man. His career became very successful. His views drastically changed to what we call the Party-line views. But how could they do that?

The answer is the same as in the Baev's case. They would try to act through the family, to provoke them. Probably Luiza tried to prepare the ground for this business for them through my naive inexperienced daughter, but her approach failed. It could be that Luiza became angry and reported to them that it was my wife who ordered my daughter to avoid the trap – to stop visiting Luiza's "club."

"Now they decided to use another approach based on your wife" – Solomon said. "It might be that they are trying to frighten her, as a punishment for the failure of their original project, if they have already reported to a supervisor that Academician Novikov will be on the hook (*na kruchke*) soon. Don't keep silence, – Solomon recommended – make noise. Noise works for us, silence works against us. Sakharov knows this very well. It looks like Shafarevich does not have good advisers and does not know this specific rule, in particular."

Let me make an additional remark clarifying this statement. My late friend Andrei Tiurin[w] (a very good mathematician, later elected as a Corresponding Member) was very close to Shafarevich. He told me at that time (in 1982) a very interesting story from the time of the Shafarevich–Sakharov interaction in the early 1970s in which the very same family participated. Shafarevich got involved in a

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[v]Alexander Aleksandrovich Baev (1904 - 1994).
[w]Andrei Nikolaevich Tiurin (1940 - 2002).

dissident-style activity in 1971, jointly with Sakharov. Luiza became his close friend, helping him with dissident materials. In the winter of 1972 or 1973 Shafarevich went to a west-Ukrainian resort for skiing, I forgot which one. A lot of people visited these nice places at that time (Yaremche, Worohta, ...). Luiza arrived there at once too, with kids.

A few days later a couple of "typical KGB agents" appeared in this place. Somehow Shafarevich noticed that Luiza met with them secretly, in a hotel backyard. He left this place by train to Moscow on the very same day. Only Tiurin was informed by him about that, Shafarevich did not distribute this information publicly.

I realized that Shafarevich made a mistake which we discussed with Solomon: he kept silence in math community about this KGB approach. It turned out later that he fully paid for this typical mistake of old-fashioned Soviet citizens educated in Stalin's times: KGB increased pressure. With a very high probability they used several times this typical Soviet weak point, described above. They worked for several years. Later they pressed him denying to his son the admission to the Moscow University when he first tried to do so. Finally, they achieved their goal successfully, as it seems to me.

I knew that all my phones were bugged. It was the reality of the Academician's life in the Brezhnev period. I started calling friends telling them loudly about this scandalous practice (*besobrasiye*); I made many phone calls. I demonstrated that I am ready to speak out about this everywhere.

Another point: Solomon pointed out to me that this *otkrytka* from KGB deserves a more careful investigation. In spite of the frightening signs printed on this sheet of paper, it was sent from an ordinary street post box, not from the KGB headquarters. If my wife appears, colonel Malov will present officially that she came voluntarily. I asked Solomon:

"Why cannot he send such mail through KGB officially next time?"

"O – Solomon answered, – his supervisor might tell him: 'Malov, are you going to summon here all Moscow intelligentsia? You are not ready yet to do delicate work in Moscow. A very good place in

Mongolia would suit better your abilities'."

I burned this mail. We never received another letter. I blame myself for that stupidity. Wouldn't it be nice to preserve this "otkrytka" as a memento?

It was September 1982. One month later Brezhnev died. Andropov took power. He removed Fedorchuk from KGB and changed the approach of the Politburo:

"No more illegal assassinations of dissidents. We do not want to transform USSR into a criminal organization as Brezhnev did. We should create necessary laws and legally try our enemies. Kids should be re-educated by KGB: one should persecute older people who are responsible."

Senderovs trial was very severe, he got at least 5 years in prison. The trials of children essentially were interrupted. Geltser was recruited (*zaverbovan*) by KGB and was used as a valuable witness. He officially got 2 years on parole, but KGB helped him to recover student's position. He finished the Institute of Steel and Alloys, but did not become a physicist. In the late Gorbachev's period Geltser became a successful member of a rich KGB-connected group, in particular, as their expert. He successfully continues doing some US-Russia business.[x]

Duduchava fled with her father to Tbilisi, Georgia. Her father died soon: his weak Georgian heart could not survived these dangerous circumstances. She returned later to Moscow but her life was seriously broken, as she told her former schoolmates many years later. Many kids who were interrogated by KGB in 1982 never completely recovered psychologically. They always felt themselves insecure in Russia and immediately left it in the early 1990s.

Pavel Aleksandrov died a week after Brezhnev. All corrupted bureaucracy immediately became terribly afraid of Andropov. Using this circumstance we annihilated (with the help of Bogoliubov[y]) an

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[x]Ilya Geltser currently resides in the US, Vladimir Mandelshtam is Professor of Chemistry and Chemical Physics at the University of California (Irvine).
[y]Nikolay Nikolayevich Bogoliubov (1909 - 1992), was a Soviet mathematician and mathematical physicist known for significant contributions to quantum field theory, classical and quantum statistical mechanics, and to the theory of dynamical systems. In 1966 -

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attempt of A. Tikhonov to deprive mech-mat departments in Soviet universities of many research programs in favor of new applied departments organized by him. He had a lot of dark and deep connections in the high-level bureaucratic circles surrounding Brezhnev. Immediately after the fall of Nikita Khrushchev his ascend became very rapid.

This story looks like some sort of a mystery about how on a day, very soon after Brezhnev's death, we found out that a secret meeting with representatives of most universities (but not the Moscow or Leningrad State Universities) was being held at the Ministry of Education; how Tikhonovs people did not allow anybody to leave the meeting until the final decision formulated and signed by the vice-Minister Egorov; how Alexandryan (the Dean of Erevan's mech-mat, a pupil of Sobolev) managed to leave it secretly through the bath room, and called me; how I and my close friend in math department of the Academy of Sciences urgently searched for Bogoliubov and finally found him in Dubna; how we succeeded to present an official protest of the Academy to the Head of Ministry of Education before anything was signed.

By the way, Tikhonov's power fell immediately after the death of Brezhnev, he tried to use an indefinite moment during the first weeks after Brezhnevs death. His influence was recovered, for a short while, during the Chernenko period, when he made the second attempt of the same kind, but it also failed. He punished Lupanov and Yablonskii who did not support him in this affair.

I took Aleksandrov's chair at mech-mat. General topology was removed from this Chair. A special Chair of General Topology was organized by Logunov with V.V. Fedorchuk as the head. So, a compromise was found between us, finally.

1988 he was the Director of the Joint Institute of Nuclear Research in Dubna. Andrei Nikolaevich Tikhonov (1906 - 1993) to whom the author refers below was a Soviet mathematician, a founder of the Department of Computational Mathematics and Cybernetics of the Moscow State University.

4.   Death of Bella Subbotovskaya-Muchnik

Bella was summoned to Lubyanka in the summer of 1982, as I was told. I don't know the exact date. She came the with materials of math examination "for Jews" trying to get admitted to mech-mat, showing to them (that is, KGB) that these exams were falsified. Either the problems were much more difficult than normal or the answers were evaluated incorrectly.

She wanted to come next time, to bring more materials. The KGB officer (*ludoved*) probably reported to higher officials that nothing can be done with her. Nobody can change her determination. No way to put her on trial as well.

She was assassinated one month before Brezhnev's death in a "car accident." This car has never been found. Clearly, there was an order from Politburo. Do not be naive, all assassinations in the late Brezhnev era were ordered by Politburo. KGB had no right to decide such things. They were executioners and advisors only. They could recommend but the final decision was not theirs.

The practice of Politburo-ordered assassinations, executed by KGB, essentially was finished, it was gone with the death of Brezhnev. However, the tale about KGB assassinations of some low-level undesirable anti-government people by the order of the highest power (performed both inside Russia and abroad) is alive until now. There were cases in the present 21$^{\text{st}}$ century when it was used by European Democracy for framing.

Everything changed when a "free democratic period" started in the late Gorbachev era: assassinations also became free, not ordered from the government level, a lot of former experienced KGB workers became members of various mafias, some leading experts were hired by the West. Money started to dominate everything in Russia including assassinations. It is difficult for younger people to make a judgment about the Brezhnev period. The realities of the new era became completely different.

Concerning the Brezhnev era, it is good to ask the following question:

"Who killed the king Charles I in England – was it the Parliament (with moderate members excluded by the Cromwell company) or

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simply an executioner?

Andropov's period was short and strange. It helped us. We saved mech-mat from Tikhonov, and antisemitism became milder. It became easier to appoint a Jew as the head of a laboratory. My pupil Buchstaber[z] felt this change on his "skin." He waited for the appointment for a few years in his applied institution, but it came only 2 months after the death of Brezhnev. Immediately an impression appeared that this question lost its status of the main interest for the new dictator. Some hopes appeared to save the Moscow University from Logunov. He was already warned by the new Politburo Member comrade Geidar Aliev that he will be removed soon, as we heard. We knew that Aliev (not without Andropov's permission) saved Kasparovs chess competition for the world crown. Knowing Armenian-Azerbaidjani relations and strong antisemitism in the USSR of that time, we can say that certainly it was a demonstration of an "internationalism" from the former Azerbaidjani Party Secretary to do that for a half-Jew and half-Armenian Kasparov (his father's name was Weinberg). No doubt, Kasparov became "their man" in 1982-83.

Using the corrupted Party bureaucracy Karpov (a favorite of Brezhnev) exerted pressure on Kasparov to cancel his match with Korchnoy under a pretext of an artificial political reason, so Kasparov already was declared defeated. Karpov was afraid of Kasparov but not of Korchnoy. But Brezhnev died, and the new dictator allowed to pay serious penalty in order to recover the Kasparov-Korchnoy match. It is interesting that Korchnoy agreed. Probably he hated Karpov and knew that he will not be able to defeat him, but Kasparov might. The subsequent steps of this story happened already after Andropov's death. We will not discuss them here.

Andropov probably was the last idealistic communist in the role of the USSR dictator. He probably believed that problems can be solved on the basis of "discipline" and strong anti-corruption activity organized by the community of professional KGB officers (not by KGB informers in the midst of scientists, engineers and teachers,

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[z]Viktor Matveyevich Buchstaber is a Soviet and Russian mathematician known for his work on algebraic topology, homotopy and mathematical physics. Currently is at the School of Mathematics, University of Manchester.

workers and peasants, bureaucrats and generals, and others – these people were only servants). Andropov also promoted Gorbachev as the third person in the Party, after him and Chernenko. But very soon he became sick and lost his second kidney. Not more than half year of life remained for him.

The Party bureaucracy seized to listen the dying Secretary General's orders, they simply kept silence doing nothing. Let us try to understand something. Andropov certainly hated the corrupted Party bureaucracy, he started to hunt it. There were rumors that already in Brezhnev's times Andropov established strong anti-corruption regulations in a narrow circle of real professional KGB officers, even A. Sakharov acknowledged that.

Andropov had very bad relations with the corrupted head of militia, Shchelokov, who was supported by Brezhnev during his last years. He was arrested after Brezhnev's death. There was also a serious anti-Andropov suspicion in Brezhnev's mind during the last year of dictator's life. Andropov was lucky that Brezhnev died before he was removed from Politburo. An "important Plenum" of the Central Committee has been already announced by Chernenko, to take place in a month. However, no traces of a plot surfaced later concerning Brezhnev's death, which looks suspicious. There is no doubt that all assassinations were carried out on Politburo's orders (i.e. those of Brezhnev). But they always were attributed in the international propaganda only to KGB. There was a "demonization" of KGB in the world opinion, it still exists now as an image of "KGB for Idiots," using American terminology from the popular literature. It was not surprising that Andropov and other high ranking KGB people did not like that. Besides that, our experience tells us that the most famous lieutenants of dictators like Beria, Khrushchev and Andropov did not considered themselves really guilty for the whole nasty collection of deeds which they made in the times of Stalin or Brezhnev. "It is him who is guilty" – probably was their real opinion. "I am going to show my real political image only when I become the Head of the State."