Math 2573H Honors Calculus III Fall Semester 2018

Assignment 4 - Due Thursday 10/4/2018

The first mid-term exam is on 10/4/2018, to be held in recitations. The questions will be on the topics we have covered from Chapter 1 and sections 2.1-2.4

Exercises from Colley:
2.3: 3, 4, 9, 16, 26, 28, 36, 38, 42, 44, 47
2.4: 9, 18, 23, 28

Notes:
Section 2.3 is a lot to read. The hardest thing conceptually is the eventual definition of the derivative, which is Definition 3.8. Colley works up to this, giving some preliminary definitions in special cases (3.4 and 3.7) which are subsumed in the actual definition 3.8. If you feel you understand 3.8 without reading the preliminary material then go for it, and don't bother with the preliminary material. For my taste, the amount of reading you have to do just makes the subject seem more difficult, as does a lack of precision at times.

At the end of the section there are some paragraphs under the title 'What is a Derivative?' This is a legitimate question, but unfortunately I don't think she answers it clearly. She almost does, but not quite. It seems to me that leaving things like this may produce more of an air of mystery about the derivative, rather than clarifying the situation.

(The answer is that the derivative of a function at a point is a linear map which, when a constant term is added, best approximates the function around that point.)

Section 2.3 and also Section 2.2 have quite long parts at the end with proofs of the harder results. The big question is, 'What is the point of this as far as our course is concerned?' I am not going to test you on these proofs, so why do we even bother? Why did we trouble to understand the definition of a limit given in terms of epsilon and delta? These are not easy questions to answer, and I am not sure what the best approach is. It partly has to do with the level of the course. There is a more advanced honors course (Math3592/3) where more emphasis is put on such proofs. Students in that course are expected to reach the stage where they understand them, and it turns out to be the hardest thing they do (and it is not even something you can see from reading the syllabus). The course we are doing now is not so demanding. Nevertheless, the ability to understand, and eventually write, such proofs is an important part of professional mathematical training, especially for people who are going to go on to be mathematicians. Like everything else it can be taught and learned. The way we learn is by studying such proofs. The most important reason for studying the proofs to some extent now is that it is a step in that direction.