As promised, here are some tips about what to study for Exam 4. It covers Sections 6.4 through 10.7 on our syllabus. That's a *lot* of material, so you can expect that I'll hit the major themes. I'm including the other topics in this guide because they could show up as 5-point multiple choice problems, and will show up in one form or another on the final.

What do I consider to be the major themes? Well, I usually consider the trig formulas in §§ 6.4-6.5 to be useful tools, but not a major topic. However, the trig equations are important, and the formulas could be necessary for the solution of a trig equation. Solving triangles is important, whether using the Law of Sines, Cosines, or good old-fashioned trignometry. De Moivre's Theorem is important, as is its "reverse," i.e. finding complex roots. And systems of equations and inequalities are important.

In general problems should be fairly similar to those in your homework or examples from lecture, but be on the lookout for anything I labeled in class as a "likely kind of test question." Remember that we like to do "backwards" problems on exams; for example, in class we'll learn how to graph a certain kind of function; on a test you might have to look at a graph and write down the function instead. Also, keep in mind that the "Recommended" problems didn't have to be turned in for credit, but similar things could show up on the exam.

You should also look at the corresponding problems for these sections in the Chapter Reviews of your textbook. If you need answers to even numbered problems, let me know.

§ **6.4** Sum and Difference Formulas. You'll be given formulas (1) and (4). Be sure you can figure out formulas (2) and (5) from these, by writing $(-\beta)$ as $+(-\beta)$, for example. Formulas like (3a) and (3b) could show up, but that's just a combination of knowing the sum/difference formulas and a few values of cos and sin.

§ **6.5** Double- and Half-Angle Formulas. You'll be given equations (1) and (2). Everything else in this section—including the Half-Angle Formulas—is a variation of those two formulas. (Sometimes you need to use the fact that $\cos^2\theta + \sin^2\theta = 1$ to get the variants.)

§§ **6.7, 6.8** Trigonometric Equations. These can be a bit tricky. To succeed, you'll have to be able to solve the "basic" trig equations in 6.7, i.e.

$$\cos\theta = \sqrt{3}/2,$$

where the function on the left could be replaced with sin or tan, and the value on the right could be anything resulting from a $30-60-90$ or $45-45-90$ triangle. Then you also need to be able to reduce the trig equations that you might get in 6.8 into the more basic ones in 6.7.

§ **7.1** Right Angle Trigonometry. Given one side length and one (non-90°) angle in a right triangle, you ought to be able to "solve" the triangle, i.e. find all of the sides and angles. Problems from this section tend to be word problems, so make sure you're ok with translating the descriptions into a mathematical picture of a triangle.

§ **7.2** The Law of Sines. Again, you should be able to use the Law of Sines to solve a triangle. Now is as good a time as any to remind you that we did a Mount Everest example (using methods from 7.1 *and* 7.2) in class, and our guest lecturer did a similar problem to find the height of a statue from 7.1. So you could expect something similar to pop up on the exam.

The tricky part about this section is the ambiguous case. Given two sides and an angle opposite them, you need to tell if there are no possible triangles, one possibility, or two.

§ **7.3** The Law of Cosines. You need to know how to use the Law of Cosines to solve triangles, too. The other tricky thing is knowing when to use the Law of Sines, and when to use the Law of Cosines. You could memorize the different cases (SSA, SAS, etc.), but it would probably be better to just do a whole bunch of these problems. Then you recognize that, "Oh, I don't have the right kind of information to solve this with the Law of Sines; I'd better use the Law of Cosines, instead."

§ **7.4** Area of a Triangle. This is a short section, but important. Make sure you know and can use the Theorem on p514. Heron's formula is cool, too, so it will show up on this exam and/or the final exam.

§ **8.1, 8.3** Polar Coordinates, Complex Roots, etc. You should be comfortable with polar coordinates, and converting back and forth between polar and rectangular coordinates. (Remember, polar coordinates are *not* unique!) More importantly, you should be familiar with complex numbers and the polar form of a complex number. De Moivre's Theorem will show up on the exam, and the formula for complex roots will be on the exam and/or the final. Remember what I told you is the most common mistake: forgetting to write down all the different values of k, so that you only get 1 root instead of, say, 5. (Assuming $n = 5$ here...)

§ **10.1** Systems of Linear Equations. This is an important topic, but goodness knows there's enough other stuff on the test. I can pretty much guarantee you that, on Exam 4 at least, you won't have to solve a 3×3 system, just a 2×2.

§ **10.6** Systems of Non-linear Equations. This is also important and, again, I won't give you anything too awful because of time constraints.

§ **10.7** Systems of Inequalities. We love letting people draw on an exam, so bring along your favorite tools, like colored pencils. (Or just be prepared to draw lines at lots of different angles...)