Review for Third Exam

The third exam will cover sections 12.8, 12.9, 12.10, 13.1, 13.2, and 13.3 of the text. The assignments on these sections were Assignments 8, 9, and 10.

12.8 We covered this entire section. It includes the definition of what is meant by "power series", given in formula (2) on page 759. Notice that the numbers $c_0, c_1, c_2, \ldots$ in a power series have to be constants; thus, for example, a series that looks like

$$\sqrt{1+x} + \sqrt{1+x}\; x + \sqrt{1+x}\; x^2 + \ldots$$

would NOT be a power series.

Each power series has an interval of convergence, which could be a single point or the entire real line; see Theorem 3 on page 761. The interval of convergence can be found by the Ratio Test, except that the question of whether the endpoints of the interval of convergence are in the interval cannot (ever) be answered by the Ratio Test. To determine whether the series converges at the endpoints, you have to use one of the other tests from the preceding sections of Chapter 12.

12.9 We covered this entire section. The main idea is that we can start with a simple function whose representation we already know (such as $1/(1-x)$, e^x, or $\sin x$, or $(1+x)^k$) and perform operations on it (such as replacing x by a power of x, or differentiation, or integration) to get representations of new functions. For this purpose it's good to have the series representations of a few simple functions memorized. I recommend memorizing the ones in the box on page 779. Actually, these are pretty easy to memorize: the first one should be familiar to you as the formula for the sum of a geometric series; the second (for e^x is easy to remember; the third (for $\sin x$) is closely related to that for e^x; the fourth can be obtained by differentiating the third; and the fifth can be obtained by integrating the series for $1/(1+x^2)$. The sixth, for $(1+x)^k$, is called the binomial series — it may be a little harder to remember, but if you're not sure you've remembered it correctly you can figure it out for yourself fairly easily as a Taylor series: see Example 8 on page 777 for how to do this.

12.10 We covered most of this section, with the following exceptions: I will not ask questions on this exam about showing that the remainder for Taylor's series goes to zero, so you do not have to review the discussion of this topic on pages 773 and 774. Also, I will not ask questions requiring you to multiply or divide two power series, so you don't need to know the procedures in Example 12 on page 781.

13.1 Most of this section may be familiar to you from earlier courses, but you should review the entire section anyway. Actually, we have not yet covered in class the material on page 804 about equations of spheres, so it will not be on the third exam. (We will cover this material next week, and it will appear on the final exam.)

13.2 You should review this entire section, except that you can skip the subsection titled "Applications" on page 812.

At the bottom of page 811 and in Example 8 on page 812, there is a short discussion of "unit vectors". I did not cover this material in class, but it's worth reading anyway.

13.3 We covered from the beginning of this section through Example 5. You can skip the remainder of the section.