Math 4163 — Review for Final Exam

The final exam is comprehensive, though it will be somewhat weighted toward the latter half of the course. It will be about one and a half times the length of the midterms exams. To see what material from the text will be covered, you can use the review sheets for the first three exams for chapters 2, 3, 4, 5, 7, and 8 (assignments 1 through 7). The material from chapter 10 (sections 10.2, 10.3, 10.4) that you should review is summarized below. See also assignment 8.

10.2. Heat equation on an infinite domain. You can skip most of this section. It solves the heat equation on an infinite domain using separation of variables, but we are more interested here in a different solution method, using Fourier transforms, that is given later in section 10.4.2. You need only read the description of the heat equation on an infinite domain in the first two paragraphs of the section.

10.3. Fourier transform pair. I went through this entire section in class. The first subsection, 10.3.1, describes where the formulas for the Fourier transform and inverse Fourier transform come from. To understand it, you'll need to know what's in section 3.6, which I also went over in class. You should be very familiar with the material in sections 10.3.2 and 10.3.3, and especially should understand the meaning of all six of the formulas in the box on page 452. (You don't need to memorize these formulas; I will provide them to you on the exam if they're needed there. But you should have used them enough to have almost memorized them.) You can skip the appendix on pages 453 to 455.

10.4. Fourier transform and the heat equation. The heart of this section is the subsections 10.4.2 and 10.4.3, which describe the basic properties of the Fourier transform, and show how to use them to get the solution of the heat equation on the infinite line. You should understand these subsections in detail, except you do not need to know about Parseval's identity. The basic properties discussed in this section are summarized in the table of Fourier transforms on page 468. Again, you won't need to memorize what's in this table, but you should know what all the entries mean and how to use them — except you won't need to know about the Dirac delta function and the entry titled "multiplication by x".

You can actually skip what's in the remainder of this section (pages 459 to 463). I think it would be a good idea instead to read a couple of the examples in section 10.6 of how to solve problems using the Fourier transforms. I did the example in section 10.6.3 in class on the last day of class.