

Review for First Exam

For this exam you should know the definition of the term “definite integral”. This definition is in the box on page 296. You do not need to give the definition word-for-word, but you should include the essential elements, with at least some indication of what the symbols mean. A version of the definition which is less formal, but still good enough, is the one I wrote on the online answer key to Quiz 1 (the little ghostly “2” between the summation sign and the f doesn’t belong there; it just didn’t quite get erased).

You should also have memorized the simple formulas for antiderivatives that you learned in Calculus I (see the box on page 270).

And, as always in calculus, you should be familiar with the laws of exponents and the basics of the trigonometric functions. There is a review sheet for trigonometric functions, available on the course web page, explaining exactly what you should know. If you’re feeling a bit dubious about the laws of exponents, you might look at this page:

<http://www.mathsisfun.com/algebra/exponent-laws.html>

Don’t be put off by the fact that it seems to have been geared towards high school students. It’s quite well done.

The exam will be over sections 4.1, 4.2, 4.3, 4.4, 4.5, and 5.1 of the textbook. Here is a list of which parts of these sections are covered on the exam, and which you can skip.

4.1. Section 4.1 is mainly intended to give you an idea of what the integral is supposed to mean, rather than show you how to actually compute things. You can review pages 284 to 285, and pages 287 to 291. This includes Examples 1 and 3, which describe how to compute some Riemann sums. If you wish, you can skip Example 2 and the subsection titled “The Distance Problem”.

4.2. This is an important and basic section; whatever time you put in reading it (it doesn’t have to be a whole lot) will make the rest of the course that much easier.

You should review from the beginning of the section through Example 1 on page 298, and from Example 4 on page 301 through the end of the section. You can skip Examples 2 and 3, and you won’t need to know formulas 5 through 11 at the bottom of page 298 and top of page 299.

One thing I neglected to discuss in class was the meaning of the word “integrable”. You won’t need to know this word for the exam, but knowing it will help you to follow what’s in the textbook. A function is said to be integrable on an interval $[a, b]$ if, in the definition of the function, the limit of Riemann sums exists. Not every function is integrable, because for some functions this limit of Riemann sums does not exist. For example, the function $1/x$ is not integrable on the interval $[0, 1]$, because its Riemann sums become infinitely large as n goes to infinity. That is, the limit of Riemann sums does not exist as a real number.

4.3. This section, on the Fundamental Theorem of Calculus, is the one, together with section 4.5, that you’ll probably want to spend the most review time on. In particular,

the examples in this section are very similar to problems you'll get on the exam. Look at Example 4, for instance, and compare it to the first problem on Quiz 2.

Read the entire section.

4.4. Review from the beginning of the section through Example 5 on page 323. Also read Example 6 on page 325. You can skip the rest of the section.

Notice the Table of Indefinite Integrals on page 322. Have you seen these before? Yes, they are just the same as the antiderivative formulas in the table on page 270, only written in a different notation.

4.5. Read from the beginning of the section through Example 7 on page 334. Even more important, try a few of the odd-numbered problems from 1 to 51 at the end of the section and see if you get the same answers as in the back of the book. Do not use a solution manual! The main function of a solutions manual, as far as I can tell, is to prevent students from figuring out how to do a problem on their own. If someone wanted to hatch a sinister plot to keep calculus students worldwide from learning, they couldn't do much better than to write solution manuals.

You can skip the section titled "Symmetry" on pages 334 and 335; though it is material that probably will come in handy for you later on, if you want to learn it now.

5.1. Review the entire section, except you can skip Examples 3 and 4.