Calculus I —Fall 2015— Review for first exam

The exam covers sections 1.4, 1.5, 1.6, 1.8, 2.1, 2.2, and 2.3 of the text. The relevant homework assignments are Assignments 1 through 3.

You should know the following for the exam:

• The definition of derivative as a limit. There are two definitions given in the text, but they're equivalent to each other, so if asked, you can give either one. They are in boxes 4 and 5 on page 109.

• The product rule and its proof. You should be able to prove the product rule if asked. There is a proof on page 135 of the text. I gave a somewhat shorter proof in class. You can also give any other version of the proof if you have one you like better.

• The other basic differentiation formulas (see the box on page 140). You will not be asked to prove any of these (except for the product rule).

• Throughout calculus, you will be expected to know the basic laws of exponents and trig identities. On this exam, there won't be much about trig functions, but you should be familiar with the laws of exponents: $a^m a^n = a^{m+n}$ and $(a^m)^n = a^{(mn)}$.

Here is a brief guide to the sections covered on the exam. The page numbers refer to the 8th edition; if you own the 7th edition instead, you might want to get hold of an 8th edition for a few minutes to figure out which pages in the 7th edition these refer to.

1.1, 1.2, 1.3. These sections contain basic material about functions that you would have learned in precalculus mathematics courses. You can glance at them to see what's in them, in case you want to refer back to them later in the course.

1.4. The material in this section is superseded by later sections, so you don't need to reread it. But you should look at the two homework problems assigned from this section, and make sure you're familiar with the procedure for (i) finding the slope of a secant line and (ii) finding an average velocity. In particular, you should be clear on the distinction between the slope of a secant line and the slope of a tangent line, and the distinction between an average velocity over an interval of time, and an instantaneous velocity at a point in time.

1.5. In this course we take an intuitive approach to limits. That is, for us the meaning of the phrase $\lim_{x \to a} f(x) = L$ is defined by what's in the box on page 51. We call this an "intuitive" definition of limit because it does not rise to the level of an unambiguous, logically complete mathematical definition. There is an unambiguous definition of limit in section 1.7 (on page 73), but since it takes a while to understand and absorb it, we won't consider it in this course.

In reviewing this section, you can just read what's on the first two pages, and skip the rest of the section for now. (We'll come back to the notion of "infinite limits" later in the course.)

1.6. You should read this section from the beginning through Example 6. You can skip the remainder of the section.

1.7. This section is not covered on the exam.

1.8. Read from the beginning of the section through Example 7. You should be able to do problems like the ones assigned from this section.

The definition of continuity is given in box 1 at the beginning of the section; I won't ask you to memorize this definition, but you should be familiar with it and its meaning, because it's important for understanding subsequent material in the text.

2.1, 2.2, 2.3. These are key sections in the text and should be reviewed in their entirety. (The one exception is that you can skip the material on pages 121 to 123 about differentiable and non-differentiable functions.) It's also a good idea to not only review the homework problems assigned from this section; but to also try some of the other odd-numbered problems from the problem sections at the end of these sections, to see if you can get the right answer without help from a solutions manual. Start by trying ones that are similar to, but not the same as, the ones that were assigned.