

## Math 221: Midterm 1 review sheet

Midterm 1 will cover all of chapter 2 and sections 3.1–3.4 and 3.6.

### From Chapter 2, you should...

- ...know what a limit is; graphically, intuitively, and formally. You will have to know the formal definition (and identify it in a multiple choice problem—the form will be equivalent to the one in the book, but not a verbatim copy, so you really have to know what it means).
- ...know what infinite limits are and what limits from the left and right are.
- ...know what a limit at infinity is.
- ...know what asymptotes have to do with limits.
- ...be able to compute limits using the limit laws.
- ...be able to solve problems involving limits.
- ...know the squeeze theorem and how to apply it to find a limit.
- ...know what a continuous function is, what the intermediate value theorem says and is good for.
- ...know what the derivative is; graphically, intuitively, and formally. You will have to compute a derivative from the formal definition, as on Quiz 1.
- ...understand what the derivative represents (slope of tangent line, rate of change, velocity...)
- ...understand the relationship between the graphs of  $f$  and  $f'$ , and more generally, what  $f'$  says about  $f$ .
- ...be able to solve various problems using the techniques and tools from this chapter.

### From Chapter 3, you should...

- ...know how to compute the derivatives of the basic functions: constants, powers, trigonometric functions, exponentials, and logarithms.
- ...know how to compute the derivative of a combination of functions, provided you can compute the derivatives of the constituent functions. The basic methods of combination are: addition, subtraction, multiplication, division and composition.

In addition: You will have to be fluent in the language of the course: for example, you will need to know all the vocabulary as it is used (e.g. if  $f$  is a function, I will not tell you that  $\frac{df}{dx}$  means the same thing as  $f'(x)$ ; the derivative of a function  $f$ . You should be able to compute quickly and accurately. You should also know the concepts well enough to be able to use them to solve problems. The best way to prepare for the exam is to work lots of practice problems.

### A whole bunch of practice problems:

§2.3: 3, 5, 15, 19, 35, 55.	§2.7: 9, 13, 21, 31, 33, 43.	§3.3: 1–15 odd, 19.
§2.4: 1, 3, 23, 25, 29.	§2.8: 3, 19, 21, 23, 25, 27, 41.	§3.4: 7–45 odd, 63, 75, 84.
§2.5: 3, 7, 15, 17, 32, 41, 47, 61.	§3.1: 3–31 odd, 51, 73.	§3.6: 3–21 odd, 33, 41, 43.
§2.6: 3, 17, 19, 25, 33, 67.	§3.2: 3–25 odd, 43, 55(a).	

Do what you have time for, but you should try to get a sampling of a variety of problems. Make sure when you differentiate a function from a problem in chapter 2 that you use the definition—you will have to do that on the midterm.