Midterm Review

This exam covers Chapter 3 in your textbook. You should be able to do the following (associated textbook sections are listed in parentheses). Not all of these problem types will appear on the exam, but you should expect to see something from every textbook section.

- Given an algebraic expression for a function, evaluate it at a given input, whether that input is a number, variable, or expression. This includes piecewise defined functions. (3.1)
- Given an algebraic expression for a function, find the function's domain. (3.1)
- Given an equation in function notation, interpret it in words. (3.1)
- Choose an appropriate viewing window for a function using your graphing calculator. (3.2)
- Graph a piecewise defined function by hand. (3.2)
- Use the vertical line test to determine whether a graph represents a function. (3.2)
- Determine whether an equation defines *y* as a function of *x*. (3.2)
- From the graph of a function, determine the following (all from 3.3):
    - Domain
    - Range
    - Output values, if given inputs [Ex: What is $f(3)$?]
    - Input values, if given outputs [Ex: Find the value(s) of *x* for which $f(x) = 3$]
    - Intervals where the function is increasing or decreasing
    - Local maxima and local minima (possibly with a graphing calculator)
- Find the average rate of change between two indicated points on the graph of a function. (3.4)
- Given an algebraic expression for a function, find the average rate of change between two numerical values [Ex: $x = 2$ and $x = 6$], a numerical value and an unknown [Ex: $x = 2$ and $x = 2 + h$], or two unknowns [Ex: $x = a$ and $x = a + h$]. (3.4)
- Describe how algebraic modifications to a function transform its graph. (3.5)
- Given an algebraic expression for a function and one or more transformations, write the equation for the transformed graph. (3.5)
- Given the graph of a function and one or more transformations, sketch the graph of the transformed function. (3.5)
- Given the graphs of an original function and a transformed function, identify the transformations. (3.5)
- Given algebraic expressions for two functions, find their sum, difference, product, quotient, or composition, and evaluate it for given inputs. (3.6)
- Evaluate compositions of two functions using only their graphs. (3.6)
- Determine whether a function is one-to-one with the horizontal line test. (3.7)
- Given an algebraic expression for a one-to-one function, find its inverse. Then use function composition to check your answer. (3.7)
- Given the graph of a one-to-one function, graph its inverse. (3.7)

For practice, you can try the following problems from your book. The answers are also in the book, at the end under Appendices.

Chapter Review (pg. 250): 7, 9, 11, 17, 19, 39, 41, 43, 45, 53, 55, 57, 59, 63, 69, 71, 75, 77, 87, 89
Chapter Test (pg. 253): 1, 2, 4, 5, 7, 8, 9, 10a, 11, 12

You may use one side of a 3-by-5 index card for notes.

Midterm Preparation Strategy

Here is a strategy that you can use to prepare for any major math exam. Feel free to modify it as you like, but it will be most effective if you do everything! Start this process as soon as possible.

1. Read through the list of objectives on the front of this sheet. If you're not sure what one of the objectives is referring to, consult the appropriate textbook section. If you're still not sure, ask!
2. Use that list (as well as your notes, homework, labs, etc. as needed) to put together a preliminary version of your notecard.
3. Using **only your notecard**, work through the Chapter Review problems listed on the front of this sheet. Keep a list of any topics or problems you struggle with. If you try to only use your notecard for reference, you'll get two benefits:
    a. If you do find that you have to look something up in your notes or book, then you'll know you need to transfer that to your notecard too. Better to figure out your notecard is missing information while studying than during the exam!
    b. The more closely you can replicate the "exam environment", the more comfortable the exam will feel for you. This also means you should try to block aside a decent amount of quiet time to sit down and work through these problems, if your circumstances allow.
4. Once you've done that, your notecard should contain all that you need it to. If you had to add a lot to it during Step 3, it may be disorganized. It's important for you to be able to quickly find the information you need on the card, so rewrite and reorganize it if necessary.
5. If you did struggle with some of the Chapter Review problems, go back and review those topics. I suggest any combination of the following that is appropriate for you:
    a. Look over your notes on that material. Ask me about anything you don't understand.
    b. Read through the textbook section.
    c. If we did a lab on that topic, look at the lab key that is posted on the class website.
    d. Look over similar problems that you did in WebAssign (hopefully you've been keeping them organized as I suggested in your WebAssign Guide!).
    e. Visit the Tutoring Center or my office for more detailed help.
6. Now you should feel fairly confident with the material. Try going back and doing the Chapter Test problems. If there's anything you're still having trouble with, repeat as needed.

During the Exam

Some advice, in no particular order:

- Ignore the order of the problems and do the easiest things first. This will help build your confidence and also limber up your mind for the more difficult problems.
- SHOW YOUR WORK! If you have made any progress toward the correct answer, you will most likely earn some partial credit even if you don't reach a solution. Also, if you make a minor error which causes your answer to be incorrect, you will likely only lose a point or two if you show work (whereas if you just wrote down that incorrect answer, you'd earn no credit at all).
- Use your time wisely. If you get stuck on something, write down as much as you can and move on. Each individual problem is only a small percentage of the overall grade.
- Keep a positive attitude. You know this material!