Digest 11

(A compilation of emailed homework questions, answered around Tuesday.)

Question. (From a student): What is on the final?

Answer. The final's content won't be finalized until around November 20th when the 118 instructors meet. But I do know some things that will and will not be on the exam so I will list them below. As I mentioned in the last digest, the past finals will resemble the present one, so at some point make sure to look at the two most recent 118 finals (links are posted on the course website and the previous digest). As before, I will repeat that the book and online homework, and the previous two 118 finals should be your first priority in studying for the final

The list below is NOT guaranteed to be an exhaustive list of all topics that could be on the exam. I will do my best to make it an exhaustive list, though.

ON THE EXAM:

- Sections 4.1-4.4: Maxima, minima, and optimization problems for functions of one variable. Derivative tests for one variable, increasing/decreasing test, etc. Graph sketching for functions of one variable.
- Chapter 5: Riemann sums, definitions and interpretations of the definite integral. Average values.
- Chapter 6: Computation of integrals. Integration by using the antiderivative directly, integration by substitution, integration by parts. Some applications from Sections 6.4 and 6.5 could be on the final, but you probably don't need to memorize the formulas from 6.4, these are just nice motivating examples for computing integrals in the first place. You might be expected to know the present and future value formulas. I will be more precise about this when I know for sure.
- Sections 8.1-8.4: Contour plots. How to draw and interpret them. Partial derivatives, both estimated from a table/contour plot and computed from a function's formula. Approximating the values of a function using derivatives (i.e. linear approximation). (We did a lot of direct computation of partial derivatives in class and on quizzes, and approximating derivatives should have been covered on the online homeworks.)
- Sections 8.5-8.6: Critical points for functions of two variables. Maxima/minima for functions $f(x, y)$ of two variables, and classification of critical points via the Hessian/Second Derivative Test. It is still unclear whether or not Lagrange Multipliers is on the exam, but I will give an update when I know for sure.
- Double Integrals: Computing some double integrals directly. Changing the order of integration. Finding the limits of integration from a picture or from a description of

the domain. Setting up the integral for integrating in x first, or integrating in y first. Average values (for functions of two variables).

STUFF I RECOMMEND TO REVIEW THAT WAS NOT MENTIONED ABOVE:

- Chain Rule, Quotient Rule, Product Rule. (This stuff is still relevant for computing partial derivatives, so it's good to review.)
- Linear approximation for functions of one variable. (The two variable version is a generalization of this formula, so it might help to remember the easier one-variable formula to then remember the two-variable version.)

NOT ON THE FINAL EXAM:

- Limits. (Though I guess it's possible to get a question about limits in disguise, e.g.: what happens to some function when x gets really big?)
- Vectors and Gradients. (Some 118 sections did not cover this, so it won't be on the final. However, it could still help you to read and interpret contour plots, to have a simpler formula for linear approximation in two variables, and for solving Lagrange Multiplier problems, assuming that is on the final. In each of these cases, note that you can avoid talking about the gradient, but avoiding the gradient makes things less natural to understand what is going on, in my opinion.)
- Three-dimensional drawing. This might help you to do other problems or visualize what is going on, but you will not be directly graded on your ability to make a three-dimensional drawing. However, you could be expected to draw a contour plot, as on our second midterm.
- Triple Integrals. (Probably no 118 section covered this.)