Review for the Second Midterm Exam - Math 124

The primary topics for this exam are:

- **derivatives, including implicit differentiation**
- **related rates**
- **linear approximation**

The relevant sections of the text are 3.4-3.6, 3.9, 3.10, 4.1, and 4.3.

Here are some things to consider about each topic.

Derivatives

For this exam, you should know how to differentiate everything. That is, you should be able to find $f'(x)$ given $f(x)$, and $f(x)$ could be any combination of algebraic expressions, trigonometric and inverse trigonometric functions, logarithmic functions and exponential functions.

Also, you should be able to find $\frac{dy}{dx}$ given an implicit equation which relates y and x. Generally, this means using *implicit differentiation*.

You should understand and be able to use the technique of *logarithmic differentiation*.

There are tons of problems in Stewart to practice. For starters, problems 7-54 of section 3.4, 5-36 of section 3.5, and problems 2-50 of 3.6 cover all the basic procedures.

Also, problems 1-50 on page 262 can't be beat.

From 3.5, I also like 59-62, 65 and 66.

Related Rates

Related rates problems come in a pretty wide variety; every problem in section 3.9 would be good practice. Try to work a bunch of different ones, particularly from the later problems in the section.

Problems 91-101 on page 264 are also related rates problems.

Linear Approximation

You should understand how the tangent line to the graph of a function can be used to estimate the value of the function.

Problems 23-31 of section 3.10 are good, basic practice.