

Calc 1: Final Study Guide

I encourage you to study your previous midterms, quizzes, homework, and class notes.

- (1) If I give you the graph of a function, you should be able to sketch the graph of its derivative and a graph of an anti-derivative.
- (2) Study implicit differentiation.
- (3) Study related rates. You will need to be able to set up word problems as well as solve them.
- (4) Study max/min problems. Again you will need to be able to set up word problems.
- (5) Be able to take derivatives of complicated functions.
- (6) Study L'Hopital's rule.
- (7) Study MVT and IVT.
- (8) Here are some integral problems worth studying:
 - (a) Given a graph be able to use various geometry formulas to calculate "signed area".
 - (b) State and prove both versions of the fundamental theorem of calculus.
 - (c) Explain why $\frac{d}{dx} \int_a^x f(t)dt \neq \int_a^x \frac{d}{dt} f(t)dt$ unless $f(a) = 0$.
 - (d) Calculate $\int_0^3 (-2x+4)dx$ using the definition of the integral.
 - (e) Use right hand endpoints and a partition of $[1, 3]$ into 4 subintervals to approximate $\int_1^3 x^3 - 1dx$
 - (f) State the formal definition of $\int_a^b f(x)dx$ and explain what it means.
 - (g) What is $\frac{d}{dx} \int_0^{\sin(x)} \cos(t)dt$?

- (h) Use the FTC version 2 to calculate the integrals from the book: 5.3:19-30, Chp 5 summary:26-33, 37, 39, 40
- (i) Calculate: $\int_{-5}^5 x^{70} \sin(x) dx$
- (j) What is the average value of $f(x) = x^3 + \frac{1}{x^3}$ on the interval $[1,3]$?