Calculus 1 — Outline for Exam 2

Main ideas

A. Limits at infinity and connection to asymptotes

B. Definition of the derivative

C. Derivative rules including product, quotient, and chain (composition)

D. Derivative formulas for power, trigonometric, inverse trig., exponential, and logarithmic functions:

$$x^n,\ e^x,\ a^x,\ \ln x,\ \log_a x,\ \sin(x),\ \cos(x),\ \tan(x),\ \sec(x),\ \arcsin(x),\ \arctan(x),\ \operatorname{arcsec}(x)$$

E. Implicit differentiation

Skills you should have

1. Be able to compute limits at infinity (i.e. $\lim_{x\to\infty} f(x)$) *algebraically* or *from a graph*

- Remember that our main technique to "simplify" limits of the form $\lim_{x\to\infty} \frac{g(x)}{h(x)}$ was to divide through by the largest power of x in the denominator

2. Be able to compute the derivative using the definition of the derivative; that is, using $\lim_{h\to 0} \frac{f(x+h)-f(x)}{h}$ instead of the derivative rules

3. Be able to compute derivatives using the derivative rules and formulas we developed

4. Be able to compute derivatives of implicitly defined functions, e.g. $\sin(xy) = x^2 + e^y$

5. Be able to use the graph of $f(x)$ to estimate and sketch $f'(x)$ (using slopes)

6. Be able to find tangent lines

How to study

I. Review core topics

II. Work *lots* of problems all of the way through—focus on WeBWorK problems and Worksheet problems

III. Practice doing several problems in a short amount of time (by timing yourself)

IV. Come talk with me if you have any questions