Exam #1 study guide · Math 124 · Calculus I · Section 8 · Spring 2007

Disclaimers about the study guide:

- Exam 1 covers sections 1.1 through 2.1. While all *topics* on the exam will be taken from this study guide, the specific *questions* on the exam will not be identical to the ones you see here.
- In addition to consulting this guide, please review all homework problems for sections 1.1 through 2.1. In particular, look at unassigned problems nearby. For example, if I assigned #14, see if you can do #13 and #15.
- For reference, you can: (*) use the back of the book; (*) use the student solution manual; (*) make use of the tutor center in Math East 145; (*) ask questions in class; (*) talk to me after class, or during office hours.

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2007-01-30

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Topics:

- Point-slope and slope-intercept forms for equations of lines.
- Composing and decomposing functions.
- Inverse functions; meaning of inverse functions including units.
- Solving a pair of equations by eliminating a variable.
- Given a pair of data points, come up with a linear equation going through those points.
- Given a pair of data points, come up with an exponential equation going through those points. (Note: I might not give you a y-intercept.)
- Solve an exponential equation using logarithms.
- Properties of logarithms.
- Transformations of functions: shift, scale, reflection.
- Drawing qualitative graphs: i.e. I give you a verbal description, without numbers, and ask you to sketch a graph.
- Definitions of amplitude, vertical shift, period, and horizontal shift for a sine or cosine function.
- Given information about a sine or cosine equation, come up with an equation which models the data.
- Given a sine or cosine equation, sketch a graph.
- Domain, zeroes, horizontal asymptotes, and vertical asymptotes for rational functions.
- Intuitive definition of limit: as x approaches some value c, does $f(x)$ approach some finite value? If so, the limit exists.
- Definition of one-sided limits and two-sided limits; computing/estimating them from a graph or data table.
- Intuitive notion of continuity on an interval: can you sketch the graph (or part of it) without picking up your pencil?
- Definition of continuity at a point: If the function $f(x)$ is defined at a point c, *and* if $\lim_{x \to c} f(x)$ exists, *and* if the two are equal, *then* the function is continuous at that point. If *any* of those three isn't true at $x = c$, then $f(x)$ isn't continuous at c. (It might still be continuous somewhere else.)
- Intuitively: if you can tell what the value of the function $f(x)$ "should" be at a point c, given its surroundings, and if you can tell what the value of the function $f(c)$ is, and if those two are the same, then the function is continuous at c.
- Difference quotients and average velocity (algebraically) as slopes of secant lines (geometrically). Know the definition and be able to compute specific values.
- Instantaneous velocity (algebraically) as the limit slopes of secant lines (geometrically). Know the definition and be able to compute specific values.
- Graphical interpretation of $f'(a)$, given a formula, data table, or graph of f.
- Estimate $f'(a)$, given a data table or graph of f.