

Test 3 Study Guide

Things you should know.

1. Stuff from the first exam.
 - (a) How to compute limits.
 - i. Multiplying by conjugates.
 - ii. Factoring.
 - iii. Limits of trig functions.
 - (b) Continuity.
 - i. The following functions are continuous everywhere:
 - A. All polynomials $p(x) = a_n x^n + a_{n-1} x^{n-1} + \cdots + a_1 x + a_0$.
 - B. The exponential function e^x .
 - C. The trig functions $\sin x$ and $\cos x$.
 - D. Any product, sum, difference, or composition of any of the above.
 - ii. Know the definition of continuity and how to show that a function is continuous or discontinuous on a given interval.
 - iii. Intermediate Value Theorem and its application to showing that solutions to certain equations exist.
 - (c) Differentiation.
 - i. Know the definition and how to use it to compute derivatives.
 - ii. Know how to interpret the derivative geometrically (as the slope of the tangent line).
 - iii. Be able to find the equation of a tangent line.
2. Stuff from the second exam.
 - (a) The Derivative
 - i. How to compute it
 - A. The derivative of a constant
 - B. Power rule
 - C. Linear Combination rule
 - D. Product rule
 - E. Quotient rule
 - F. Chain rule
 - ii. How to interpret the derivative as a rate of change.

- A. Position function and how it is related to the velocity function and the acceleration function.
 - B. Be able to compute rates of change with respect to different variables. E.g., problems 49-53 in § 3.3.
 - iii. How to interpret the derivative graphically.
 - A. What information about $f(x)$ can be derived from its derivative and vice versa.
3. New stuff.
- (a) Know and *understand* the statement of the Absolute Maxima and Minima theorem (pg144)
 - (b) Be able to apply the above theorem to find an absolute maximum or an absolute minimum of a continuous function on a closed interval.
 - (c) Know the standard volume, area, and perimeter equations (Sphere, Cylinder, Cone, Circle, Box, Square, etc...)
 - (d) Similar triangles
 - (e) New derivatives
 - i. trig functions
 - ii. exponential functions and the natural logarithm
 - (f) Be able to set up and solve a max min story problem like those in the homework.
 - i. Identify the quantity that is to be minimized or maximized.
 - A. Write this as a function of one variable.
 - ii. Identify a closed interval of interest (possibly using a constraint or physical properties (can't have negative length etc...))
 - iii. Show that the function is continuous on this closed interval.
 - iv. Find all possibilities for the extrema (endpoints and critical points)
 - A. Recall a critical point for a function $f(x)$ is a point so that $f'(x)$ is either undefined or zero.

- v. Check these values to in the function to determine which gives the desired minimum or maximum.
- vi. Be able to write a complete sentence that finishes the problem.

My office is Boyd 434E and my email is chadm@math.uga.edu. If you need help, let me know. Remember it is my job to help you understand this material.