**Math 3A Test 3 Study Guide**

1. Related Rates (Sec 3.9)

a) Define your variables (values that change).

b) Use the given information to write an equation relating your variables.

c) Differentiate implicitly. (Note: Your variables are functions of time t, so use the chain rule for your variables!)

d) Plug in known values and solve for the rate you need to find.

1. Linear Approximation (Sec 3.10)



1. Differentials (Sec 3.10)



1. Hyperbolic Functions (Sec 3.11)



1. Absolute Maxima/Minima (Sec 4.1)
2. Find the critical numbers (whereanddne).
3. Plug in the endpoints and critical numbers into.
4. The largest result is the absolute maximum and the smallest result is the absolute minimum.
5. Use derivatives to find when a function is increasing/decreasing and local maxima/minima.

(Sec 4.3, 4.5, no graphing))

1. Find the critical numbers (whereanddne).
2. Use the first or second derivative test.

First Derivative Test: If c is a critical number of and

1. changes from increasing to decreasing at c, then has a local maximum at .
2. changes from decreasing to increasing at c, then has a local minimum at .

Note: If , then is increasing.

If , then is decreasing.

Second Derivative Test: If c is a critical number of and

1. , then has a local maximum at .
2. , then has a local minimum at .
3. , then use the First Derivative Test.
4. Use derivatives to find intervals of concavity and inflection points. (Sec 4.3, 4.5, no graphing)

* Ifthen is concave up.
* Ifthen is concave down.
* An inflection point is a point where a function changes from CU to CD or CD to CU.

1. Mean Value Theorem (Sec 4.2)

 where c is a number in (a, b)

1. L’Hospital’s Rule (Sec 4.4)

 (for or)

1. Optimization (Sec 4.7)
2. Identify unknowns and name them.
3. Use the given information to write an equation relating the variables and solve for one of the variables.
4. Write an equation for the value that needs to be maximized or minimized.
5. Plug in your solution from Step b.
6. Differentiate and find the maximum or minimum.

Note: For demand problems,

