MAT 161 Final Exam Name

Wednesday, Dec. 12, 2012

1. Calculate the following limits:
   1.  b. 
2. Use the definition of the derivative to find *f′(x)* when *f(x)* = 5*x*2 +3*x+7*.
3. Give a delta-epsilon argument that 
4. Tell why f(x) = │x+7│ is not differentiable at *x* = -7 but is continuous there.
5. Calculate for the following:
   1. 
   2. 
   3. 
   4. 
   5. 
   6. 
6. Use a linear approximation to estimate 
7. Find the equation of the tangent line to the curve  at (1,-7).
8. Water is pumped at the rate of .01 cubic yard per minute from a coneof height 2 yards and of radius 3 yards at the base. How fast is the depth of the water falling in the cone when the depth is .5 yards?

[For additional extra credit: Suppose the bottom 1/3 (in volume) of the cone is filled with a fluid weighing 1800 lbs per cubic yard. How much work is done in empting the cone by pumping the fluid to a valve at the top of the sphere.]

1. What are the dimensions of a cylinder of maximum volume if the surface area is to be 20 square meters?
2. Calculate
   1. * b. *

1. For 
   1. Calculate the first and second derivative of *f(x).*

* 1. Find the intervals where *f(x)* is increasing and decreasing.

* 1. Find the intervals where *f(x)* is concave up and concave down.

* 1. Identify the local maximum, local minimum, and inflection points.

* 1. Find the *x*- and *y*-intercepts of *y = f(x).*

* 1. Sketch the graph of *y = f(x).*

1. The volume of cube is estimated to be 1000 +/- .02 cubic cm. Estimate the edge and the measurement error for the edge. 
2. Find the area from *x* = 0 to *x* = 5 between the *x*-axis and the curve *y* = 3*x* + x.

1. Evaluate the Riemann Sum for *f(x)* = 4*x* +2, 5 ≤ *x* ≤ 8, with six subintervals, taking the sample points to be midpoints.
2. Find *f(x)* if *f′′(x)* = 3*x*2 – 6*x* and *f*(1) = 10 and *f′* (1) = 2.

1. Find the average value of *f(x)* = *x*4 on [1 , 4].

1. *a.* Calculate the area between the curves *y* = x3 and *y* = x.

* 1. Rotate the area in (*a*) about the *y*-axis and give the integral that determines the value. Do not evaluate the integral.

* 1. Rotate the area in (*a*) about the *x*-axis and give the integral that determines the value. Do not evaluate the integral.