MAT 161 **Test 3** **Name** _____

Spring 2016

Instructions: To receive credit for all answers, show all work clearly in the space provided.

1. Find the dimensions of a 100 cubic foot steel box with an open-top and a square base, that is of minimal surface area.

2. Assume a linear demand equation and a total cost function of $C(x) = 2x + 100$ dollars to produce and sell x widgets per day. 1000 widgets can be sold per day at a price of 5 dollars per widget and 900 widgets per day can be sold at a price of 6 dollarss. What should the price be in order to maximize profits ?

3. Calculate $\lim_{x \to 0} \dfrac{1 + \sin(3x) - \cos(5x)}{4x}$.

4. Find f(x) if f "(x) = 30x , f '(0) = -6 and f(0) = 10 .

5. Use an initial guess of 1 and Newton's Method once to estimate the solution to $x^3 - 5x + 3 = 0$.

6. How far does it take a car to sop if it is traveling 60 miles per hour when a constant braking deceleration of -4ft per second squared is applied?

7. For $f(x) = x^3(x-5)$

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

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

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

d. Identify the local maximum, local minimum, and inflection points.

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

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