Test 2 Spring, 2014 Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

MAT 162 Gurganus

Directions: Show all work for partial credit purposes. You may use a graphing calculator. The test is closed book.

1. Use Euler’s Method to approximate y(2.2) given $\frac{dy}{dx}$ = 4x - 5y, and y(2) = 1. Use a stepsize of 0.1 .
2. Find y(x), the solution to $\frac{dy}{dx}$ = (y 2+ 1)( x 2+ 1) , y(0) = π/4.
3. Find y(x), the solution to $\frac{dy}{dx}$ = ex + y , y(0) = 1 .
4. A tank is filled with 200 liters of contaminated water containing 2 g of toxins. Water containing .005 g of toxin per liter is pumped in at a rate of 10 l/min., mixes instantaneously, and then is pumped out at the same rate. Find y(t) the number of grams of the toxin in the tank t minutes after the rinse begins. Then find the time at which there is 1 kg of toxin present.
5. First find the solution to $\frac{d^{2 }y}{dx^{2}}$ +2$\frac{dy}{dx}$ -80y = 0 , y(0) = 0, y'(0) = 1.
6. Find the value of k so that f(x) = x-3 + kx-4 is a probability density function on [1,+∞) and then find the value of the mean for the probability density function.
7. Find the area of the surface generated by rotating about the x-axis the graph of y = sin(2x) from 0 to π/4.
8. Let A be the region bounded by y = -2x and y = x2-3. Suppose A has a uniform mass density ρ. Find the moment about the x-axis and the moment about the y-axis. You need only set up the integrals; you do not have to evaluate them.