Test 3 Fall, 2017 Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

MAT 162 version 1 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(1.1) given $\frac{dy}{dx}$ = 10x + 5y, and y(1) = 2 Use a stepsize of 0.05 .
2. Find y(x), the solution to $\frac{dy}{dx}$ = (2 + y)( x 2+ x) , y(0) = π/4.
3. Find y(x), the solution to $\frac{dy}{dx}$ = 15x+ $\frac{2y}{x}$ , y(1) = 2 .
4. A large tank is filled with 1000 liters of contaminated water with a concentration of .005 grams of toxins per liter of water. Water containing .003 g of toxin per liter is pumped in at a rate of 10 l/min., mixes instantaneously, and then is pumped out at a rate of 20 l/min.. Find y(t) the number of grams of the toxin in the tank t minutes after the rinse begins. Then calculate y(50).
5. First find the solution to $\frac{d^{2 }y}{dx^{2}}$ +10$\frac{dy}{dx}$ -24y = 0 , y(0) = 1, y'(0) = 2.
6. A biological population is growing at a rate directly proportional to the size of the population. At t = 0 hours, the population is 100 units and at t= 2 hours the population is 150 units. Find the population at t = 5 hours.