

# Math 3331- HW4

1. Suppose a population of rabbits are formed. Initial there are 15 rabbits and it is observed that after 90 days there are an additional 12 rabbits. If the area in which the rabbits live is limited to 500, formulate a differential equation and solve to determine the number of rabbits at a given time.
2. A cup of coffee (temperature = 190F) is placed in a room whose temperature is 70F. After five minutes, the temperature of the coffee has dropped to 160F. How many more minutes must elapse before the temperature of the coffee is 130F?
3. Suppose a tank initially has 10 pounds of salt dissolved in 100 gallons of water. If brine at a concentration of  $\frac{1}{4}$  pound of salt per gallon is entering the tank at the rate of 3 gallons per minute and the well stirred mixture leaves the tank at the same rate, how much salt is left in the tank after 30 minutes? What is the maximum amount of salt which accumulates in the tank?
4. A 200-gal tank is half full of distilled water. At time  $t$ , a solution containing 0.5 lb gal of concentrate enters the tank at the rate of 5 gal min, and the well-stirred mixture is withdrawn at the rate of 3 gal min. a. At what time will the tank be full? b. At the time the tank is full, how many pounds of concentrate will it contain?

Due: Friday Mar. 9, 2018