

Homework #4

Math 527, UNH spring 2015

Due Tuesday, Feb. 17 in recitation.

Problem 1: A thermometer is removed from a room where the temperature is 70° F and is placed outside where the air temperature is 10° F. Half a minute later, the thermometer reads 50° F. What is the reading on the thermometer one minute after being taken outside? How long will it take for the thermometer to reach 15° F?

Problem 2: A tank contains 200 liters of water in which 30 grams of salt is dissolved. Brine containing 1 gram of salt per liter is pumped into the tank at a rate of 4 L/min. The well-mixed solution is pumped out at the same rate. Derive a function $A(t)$ for the number of grams of salt in the tank at time t .

Problem 3: Two chemicals A and B combine in reaction to form a chemical C. The rate of production of C is proportional to the amounts of chemicals A and B present at any given instant. Two grams of A combine with one gram of B to form three grams of C. Initially, there are 100 grams of A, 50 grams of B, and 0 grams of C. Ten minutes later, 10 grams of C have been formed. Derive a function $c(t)$ for the number of grams of C at time t . How many grams of C are formed in the limit of infinite time? How long does it take for half that amount of C to be produced?

These problems are taken from Zill's textbook, exercises 3.1 and 3.2.