

First-order application problems.

Directions: Solve each of the first-order application problems. Submit your problems to me by email and I will apply up to 7 points per problem to your Exam #1 grade. (The total of your Exam #1 grade and these points cannot exceed 100.)

1. A tank is filled with 500 gallons of brine solution containing 5 pounds of salt at the outset. A brine solution containing 10 ounces of brine per gallon flows into the tank at the rate of 4 gallons per minute. The well-mixed solution flows out of the tank at the same rate. Set up and solve the system to determine the amount of salt in the tank after 2 hours.

Part 2. If the outflow from the tank is 5 gallons per minute, how does this change the differential equation. How long would the solution to that system apply?

2. A cup of tea is poured with a water temperature of 200-degrees and left on the counter to cool in a room temperature of 75-degrees. If it takes 5 minutes to drop to 150-degrees, what is the temperature after 10 minutes?
3. Cobalt-57 is a radioactive element that takes about 272 days to decay to half its original quantity. How long has a sample of Cobalt-57 been decaying if only 3% of its original sample remains?