Lesson 8

Notes

## Examples

**Example 1.** A 1000-gallon tank initially contains 800 gallons of brine containing 75 pounds of dissolved salt. Brine containing 3 pounds of salt per gallon flows into the tank at the rate of 4 gallons per minute, and the well-stirred mixture flows out of the tank at the rate of 1 gallon per minute. Set up a differential equation for the amount of salt, A(t), in the tank at time t.

**Example 2.** A tank contains 1000 L of brine with 15 kg of dissolved salt. Pure water enters the tank at a rate of 10 L/min. The solution is kept thoroughly mixed and drains from the tank at the same rate. How much salt is in the tank (a) after t minutes and (b) after 20 minutes?

**Example 3.** In a particular chemical reaction, a substance is converted into a second substance at a rate proportional to the square of the amount of the first substance present at time t. Initially, 42 grams of the first substance was present, and 1 hour later only 15 grams of the first substance remained. What is the amount of the first substance remaining after 3 hours?

**Example 4.** The rate of change in the number of miles of road cleared per hour by a snowplow is inversely proportional to the depth of the snow. Given that 21 miles per hour are cleared when the depth of the snow is 2.2 inches and 13 miles per hour are cleared when the depth of the snow is 8 inches, then how many miles of road will be cleared each hour when the depth of the snow is 11 inches?

**Example 5.** A 500-gallon tank initially contains 340 gallons of pure distilled water. Brine containing 4 pounds of salt per gallon flows into the tank at the rate of 4 gallons per minute, and the well-stirred mixture flows out of the tank at the rate of 4 gallons per minute. Find the amount of salt in the tank after 5 minutes.