

Math 026L.04 Spring 2002
Assignment #5

This assignment is due Wednesday, February 27, 2002. You must work through all problems on your own. You may consult any reference materials, and seek help in the Help Room, but do not discuss these problems with anyone else in the class. Answers must be justified whenever possible in order to earn full credit.

1. A tank contains 25 pounds of salt dissolved in 200 gallons of water. There is a pipe at the top of the tank to bring in additional solution and a pipe at the bottom of the tank to drain off solution. The tank itself contains a large stirrer that keeps the solution in the tank thoroughly mixed. Starting at time $t = 0$, water containing $\frac{1}{2}$ pound of salt per gallon enters the tank at the rate of 4 gallons per minute, and the well-stirred solution leaves the tank at the same rate.

- (a) Find the quantity of salt in the tank as a function of time. (*Be sure to specify a differential equation that describes the rate of change of the amount of salt in the tank and an initial condition for your differential equation.*)
- (b) How much salt is there in the tank after 10 minutes?
- (c) How much salt will be in the tank after a very long time? Does this answer depend on how much salt there was in the tank at the start of the process? Why or why not?

2. Calculus Page 513 #14

3. Calculus Page 520 #2

4. Calculus Page 521 #7

5. Calculus Page 521 #8

6. Coursepack Page 75 #3