Math 026L.01 Spring 2000
Quiz #6   Name: _____

You have 20 minutes to complete this quiz which is worth 20 points. Calculators are permitted, but no other aids are allowed. Show all work neatly and in order, and clearly indicate your final answers. Answers must be justified whenever possible in order to earn full credit. When you do use your calculator, sketch all relevant graphs and write down all relevant mathematics.

1. (*10 points*)

  a. (*2 pts*) Find the equilibrium solution to the differential equation $\dfrac{dy}{dt} = 0.5y - 250$.

  b. (*3 pts*) Find the general solution to this differential equation.

  c. (*3 pts*) Sketch the graphs of several solutions to this differential equation, using (at least three) different initial values for y.

  d. (*2 pts*) Is the equilibrium stable or unstable? Why?

2. (*10 points*) A tank contains 1000 L of brine with 15 kg of dissolved salt. Pure water enters at a rate of 10 L/min. The solution is kept thoroughly mixed and drains from the tank at the same rate.

    a. (*8 pts*)   How much salt is in the tank after 20 minutes?

    b. (*2 pts*)   After a very long time, what is the concentration of salt in the tank?