Math 2080: Differential Equations
Worksheet 2.7: Advanced mixing problems

NAME:

1. A tank contains 100 gallons of salt water that has a salt concentration of 1 oz/gal. Fresh water flows into the tank at a rate of 5 gal/min, and water drains from the tank at 7 gal/min.

   (a) Write down (but do not solve!) an initial value problem for the following two mixing problems.

   (b) Using only your physical intutiton, find a simple particular solution to the mixing problems above (that is, with a *different* initial condition). You should be able to do this in your head.

2. Consider two tanks: Tank A contains 100 gal of water in which is dissolved 20 oz of salt. Tank B contains 200 gal of water in which is dissolved 40 oz of salt. Water with salt concentration of 1 oz/gal flows into tank A at a rate of 5 gal/sec. There is a drain at the bottom of tank A through which the solution flows directly into tank B at the same rate. The solution leaves tank B through a drain at a rate of 2.5 gal/sec. If $x(t)$ and $y(t)$ represent the salt content in Tanks A and B, respectively, write down a system of differential equations, including initial conditions, that would model this scenario.