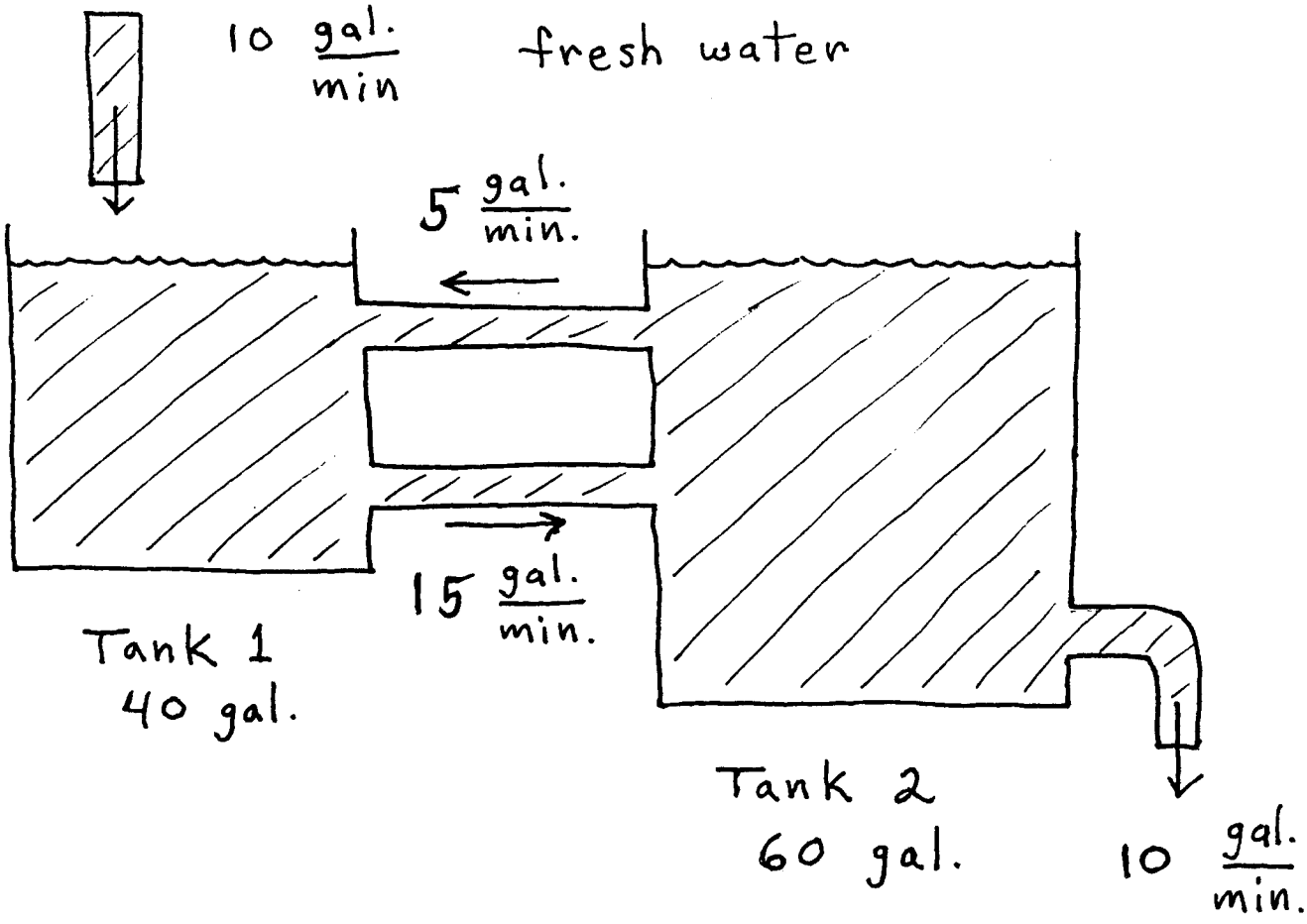
Math 17C
Kouba
Worksheet 6

1.) Consider the two tanks containing salt water solutions and connected as shown in the diagram. Tank 1 holds 40 gallons of salt water solution. Tank 2 holds 60 gallons of salt water solution. Let x_1 and x_2 represent the pounds of salt in Tank 1 and Tank 2, resp., at time t. Initially, Tank 1 contains 25 pounds of salt and Tank 2 contains 15 pounds of salt. The mixture in each tank is kept uniform by stirring, and the mixtures are pumped from each tank to the other at the rates indicated in the figure. In addition, fresh water is pumped into Tank 1 at the rate of 10 gal./min.; the mixture leaves Tank 2 at 10 gal./min. Set up and solve a system of differential equations with initial conditions, which represents the amount of salt in each tank.

Let x_1: lbs. of salt in Tank 1 at time t
x_2: lbs. of salt in Tank 2 at time t
t: minutes



2.) Consider the two tanks containing milk and Hershey's chocolate syrup mixtures and connected as shown in the diagram. Tank 1 holds 25 gallons of mixture. Tank 2 holds 35 gallons of mixture. Let x_1 and x_2 represent the ounces of Hershey's syrup in Tank 1 and Tank 2, resp., at time t. Initially, Tank 1 contains 50 ounces of syrup and Tank 2 contains 30 ounces of syrup. The mixture in each tank is kept uniform by stirring, and the mixtures are pumped from each tank to the other at the rates indicated in the figure. In addition, a mixture containing 7 ounces of syrup per gallon is pumped into Tank 1 at 3 gal./min.; a mixture containing 9 ounces of syrup per gallon is pumped into Tank 2 at 2 gal./min.; the mixture leaves Tank 2 at 5 gal./min. SET UP, BUT DO NOT SOLVE, a sytem of differential equations with initial conditions, which represents the amount of Hershey's syrup in each tank.

Let x_1: oz's. of syrup in Tank 1 at time t
x_2: oz's. of syrup in Tank 2 at time t
t: minutes