EXAMPLE 1: Let $S$ represent the amount (in pounds) of salt in a tank at time $t$ minutes. A solution containing 2 lbs. of salt per gallon flows into a tank at the rate of 3 gal./min. and the well-stirred mixture flows out of the tank at the same rate. The tank initially holds 500 gallons of solution containing 25 lbs. of salt.

a.) Set up a differential equation with initial conditions representing the rate of change of salt in the tank. Solve the equation.

b.) How much salt is in the tank after 10 minutes? after 1 hour?

c.) How much salt do you expect to be in the tank as $t$ gets infinitely large?

EXAMPLE 2: Let $S$ represent the amount (in pounds) of salt in a tank at time $t$ minutes. A solution containing 2 lbs. of salt per gallon flows into a tank at the rate of 3 gal./min. and the well-stirred mixture flows out of the tank at the rate of 5 gal./min. The tank initially holds 500 gallons of solution containing 25 lbs. of salt.

a.) How many gallons of solution are in the tank after 1 minute? after 10 minutes? after 50 minutes? after $t$ minutes? When will the tank be empty?

b.) Set up a differential equation with initial conditions representing the rate of change of salt in the tank. Solve the equation.

c.) How much salt is in the tank after 10 minutes? after 100 minutes? after 200 minutes? after 240 minutes?

d.) What will be the maximum of salt in the tank and at what time will it occur?