

Group members (2 to 4): \_\_\_\_\_

- (1) Consider three well-stirred tanks, each containing 1 liter.  $r$  liters of fluid per minute is sent from tank 1 to 2, from tank 2 to tank 1, from tank 2 to tank 3, and from tank 3 to tank 2. Initially tank 1 is filled with pure water, tank 2 is filled with brine at a concentration of 2 grams of salt per liter, and tank 3 is filled with brine at a concentration of 4 grams per liter.

(a) Write down the differential equations and initial conditions for the amount of salt in each tank ( $x_1$ ,  $x_2$ , and  $x_3$ ).

(b) Solve the differential equations.

(c) Find a value of  $r$  so that the concentration of salt in tank 3 is three times that of tank 1 at time  $t = 1$  minute.