

Math 217 - September 9, 2010

- Linear equations and applications

1. Solve

$$xy' + 2y = 4x^2; \quad y(1) = 2$$

2. Draw a slope field and some solutions curves to

$$xy' + 2y = 4x^2$$

3. Solve

$$x^2y' + xy = \sin x$$

Lecture Problems

4. A 50 gallon tank initially contains 10 gallons of fresh water. At time $t = 0$ a solution containing 1 lb of salt per gallon is poured into the tank at a rate of 2 gallons per minute. At the same time, the well-stirred mixture leaves the tank at a rate of 4 gallons per minute.
- Find an expression for volume of the tank.
 - At what time does the tank overflow?
 - Write down the differential equation to model the amount of salt in the tank.
 - Find an integrating factor for the linear equation.
 - Find the general solution to the linear equation.
 - Find the particular solution to the linear equation.
 - Find the amount of salt in the tank when the tank overflows.