

Math 285
Spring, 2009

Name _____

Homework #1
Due Tuesday, March 10
No late papers accepted! No excuses!

Find the general solution of each differential equation.

1. $xy' + y = \sin x$

2. $y' = y + 2x(y - e^x)$

3. $(x^2 - 1)(y' - 1) + 2y = 0$

4. $\frac{dy}{dx} - x^2 y = \sqrt{y}$

5. The rate of growth in the number N of elk in a game preserve varies jointly over time t (in years) as N and $300 - N$ where 300 is the estimated limiting size of the herd.
- Write and solve the differential equation for the population model if $N = 50$ when $t = 0$ and $N = 75$ when $t = 1$.
 - At what time is the population increasing most rapidly?

6. A tank whose volume is 200 L is initially half full of a solution that contains 100 g of chemical. A solution containing 0.5 g/L of the same chemical flows into the tank at a rate of 6 L/min, and the well-stirred mixture flows out at a rate of 4 L/min. Determine the concentration of chemical in the tank just before the solution overflows.