Introduction to Differential Equations – Math 286 X1
Fall 2009
Homework 2 — due September 9

Solve each of the following differential equations:

1. $y' + 3xy = 0$
2. $y' + 3y = 3x$
3. $\dfrac{dy}{dt} = \cos(t)y$
4. $x^2\dfrac{dy}{dx} - y = 3$

Solve each of the following IVPs:

5. $y' - 2y = 0, \quad y(0) = 0$
6. $\dfrac{dy}{dx} = x^2y, \quad y(1) = 2$
7. $(1 + x)y' + y = 3, \quad y(0) = -1$
8. $xy' + (3x + 1)y = 5, \quad y(2) = 4$

---

9. (Problem 1.5.36 from book.) A tank initially contains 60 gal of pure water. Salt water containing 1 lb of salt per gallon enters the tank at 2 gal/min, and the perfectly mixed solution leaves the tank at 3 gal/min. Thus the tank is empty after 1 hour. Find the amount of salt in the tank after t minutes. Determine the maximum amount of salt ever in the tank.

10. Find constants A, B so that
$$y(x) = A\sin x + B\cos x$$
is a solution of
$$y' + y = 4\sin x.$$
Now, find constants A, B, C so that
$$y(x) = A\sin x + B\cos x + Ce^{-x}$$
is a solution to
$$y' + y = 4\sin x, \quad y(0) = 4.$$