Homework 2
Math 22B, Summer Session 1, 2016
Due: Before class on Wed, July 6

**Problem 1:**
Find the general solutions of the following equations. To do this problem, first, you need to check whether the equation is exact or not. If so, you can solve it directly. If not, please use integrating factors to solve it.

(a) \((2y + 3) + (2x - 2)y' = 0\)

(b) \((\frac{y}{x} + 6x) + (\ln x - 2)y' = 0, x > 0\)

(c) \(y + (2xy - e^{-2y})y' = 0\)

(d) \((3x^2y + 2xy + y^3) + (x^2 + y^2)y' = 0\)

(e) \(e^x + (e^x \cot y + 2y \csc y)y' = 0\)

**Problem 2:**
Use Euler’s Method to approximate the solutions of the following equations.

(a) \(y' = x + y, y(0) = 0\)
\(0 \leq x \leq 1, h = 0.2\)

(b) \(y' = x^2 - 3y, y(0) = 1\)
\(0 \leq x \leq 5, h = 1\)

**Problem 3:**
Find the equilibrium solutions of the following difference equations. Determine whether they are stable or not.

(a) \(x_{n+1} = 5x_n - 4\)
(b) \[ x_{n+1} = \frac{x_n}{2} + \frac{1}{x_n} \]

(c) \[ x_{n+1} = 3x_n^2 \]

**Problem 4:**
Find the general solutions of the equations:
(a) \[ y'' + 2y' - 3y = 0 \]
(b) \[ y'' - 8y' = 0 \]

**Problem 5:**
Find the solutions of the initial value problems:
(a) \[ y'' + 5y' - 6y = 0, \; y(0) = 4, \; y'(0) = 2 \]
(b) \[ y'' + 4y' + 3y = 0, \; y(0) = 2, \; y'(0) = -1 \]