MA 2326
Assignment 1
Due 6 February 2014

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1. For each of the following equations or systems give the order and state whether it is linear or not. Do not attempt to solve.

   (a)
   $$dx/dt = -y, \quad dy/dt = x$$

   (b)
   $$\left(\frac{dy}{dx}\right)^2 = 4y^3 - g_2 y - g_3$$

   (c)
   $$x\frac{d^2y}{dx^2} + (1-x)\frac{dy}{dx} + ny = 0$$

   (d)
   $$\frac{d^2x}{dt^2} + (x^2-1)\frac{dx}{dt} + x = 0$$

2. Solve the initial value problem
   $$\frac{dy}{dx} = \frac{3x^2 - 4x - 1}{2y}, \quad y(0) = \sqrt{2}.$$

3. Find *all* solutions[1] of the differential equation
   $$\frac{dy}{dx} = y^2 - 1.$$

[1]Do not list the same solution more than once.