Homework Assignment # 1, Due January 13, 2016

1) Is the function $(\cos x)\ln\cos x + x\sin x$ a solution of the ODE $y'' + y = \sec x$ on the real line $(-\infty, \infty)$? Why? (In other words, explain your reasoning.) What is the order of this ODE? Is this ODE linear or nonlinear?

2) Consider the function $\tan x$. Find a first order ODE for which this function is a solution on the interval $(0, \pi/2)$. Also find a second order ODE for which this function is a solution on the interval $(0, \pi/2)$.

3) Solve the IVP $(x^2+1)y' + 4xy = x, \qquad y(2) = 1.$

4) Solve the ODE $xy' + 3y = 6x^3$ on the interval $x > 0$.

5) Solve the IVP $y' - y = \sin 2x, \qquad y(0) = 0.$

Also from the text:

Section 1.1: odd numbered Problems 1–7 and 11–17, then 31, 33, 35
Section 1.2: odd numbered Problems 1–13
Section 2.3: Problems 3,7,9,13,17,21,25,31