HOMEWORK 5

Due: 10/03/2016

1. Textbook Exercises

5.3: 3, 8, 11, 15

5.4: 1, 6, 21, 28, 37, 41, 42

Comment: A hint for question 5.3.15 is using Theorems 5.3.1 and 3.2.1, but you may first need to notice an obvious solution which has the same initial value at $x_0 = 0$ as the claimed solution $y = x^2$.

For question 5.4.6, try a substitution of the independent variable.

2. Additional Questions

A1. For the following second-order equations, state how you plan to obtain/approximate a solution, then choose TWO to solve completely. (You may leave the result as an integral, if needed.)

(1) $$x^2 y'' + x y' - y = x^2 e^{-x}, \quad x > 0;$$

(2) $$y'' - x f(x) y' + f(x) y = 0, \quad \text{where } f(x) \text{ is some given analytic function};$$

(3) $$y'' + x^3 (\cos x) y' + (e^x) y = 0, \quad \text{near } x = 0.$$

A2. Solve Problem 15 from Prof. Nolen's *Additional Homework Problems*.