MAP 2302 ELEMENTARY ORDINARY DIFFERENTIAL EQUATIONS

HOMEWORK ASSIGNMENT #6, DUE FEBRUARY 24, 2016

1) Given that $y_1 = x^{-1/2} \sin x$ is a solution of the equation

$$x^2 y'' + xy' + (x^2 - \frac{1}{4})y = 0,$$

find the general solution of this equation.

2) Is $\{e^x, 3e^x\}$ a fundamental set of solutions for the equation $y'' - 2y' + y = 0$? What about $\{e^x, 3e^{-x}\}$? And what about $\{e^x, xe^x\}$? Finally, what about $\{e^x, 3xe^x\}$? Justify your answers.

3) Show that $\{x^2, x^{-1}\}$ is a fundamental set of solutions for the equation $x^2 y'' - 2y = 0$, $x > 0$. Find the solution of the initial value problem $x^2 y'' - 2y = 0$, $y(1) = 1$, $y'(1) = 2$.

4) Given that $y_1(x) = e^{2x}$ is a solution of

$$(2x + 1)y'' - 4(x + 1)y' + 4y = 0,$$

find the general solution of this equation.

5) Find the general solution of the ODE $3y'' - 6y' + 5y = 0$.

Also from the text:

Section 4.1: Problems 1, 3, 5, 23, 25, 27

Section 4.2: Problems 1-19 (odd)

Section 4.3: Problems 1-13 (odd)