Homework 4

Last name: _____

First name: _____

Due at the beginning of the class on Friday October 28th, 2016.

1. Find the general solution to

   (a) $y'' + 6y' + 13y = 0$.

   (b) $2y'' - 7y' + 3y = 0$.

2. Solve the initial value problem

   (a) $9y'' + 6y' + y = 0, \qquad y(0) = 1, \quad y'(0) = 2.$

(b) $y'' + 4y' + 29y = 0, \qquad y(0) = 3, \quad y'(0) = 1.$

3. Find a second order homogeneous differential equation with constant coefficients such that its general solution is

$$y = c_1 + c_2 e^{3x}.$$

4. The functions

$$y_1 = 2\sin^2 x, \qquad y_2 = 3\cos^2 x$$

are solutions to a homogeneous second order linear differential equation on the interval $\left(0, \frac{\pi}{2}\right)$. Determine whether they are a fundamental set of solutions.

5. Consider the initial value problem

$$2y'' + 5y' + 2y = 0, \qquad y(0) = 4, \quad y'(0) = 1.$$

(a) Determine the maximum value of the solution.

(b) Find the point where the solution is zero.