Math 222 Quiz 7

March 23, 2011

Your Name: *Your Section:*

Instructions: You have 20 minutes to solve the following problems and the total score is 10 points. Below, y is a function of x.

1. Find the general solutions:
   a) $y'' - y' - 12y = 0$ (2 pts)   b). $y'' + 2y' + 4y = 0$ (3 pts)

2. Find the unique solution to the following: (3 pts)
   $y'' + 4y' + 4y = 0$ $y(0) = 0, y'(0) = 1$

3. a). If y_1 and y_2 are solutions to $y'' - 5y' + 6y = 0$, how about $y_1 + y_2$? (1 pt)
   b). If y_1 and y_2 are solutions to $y'' - 5y' + 6 = 0$, how about $y_1 + y_2$? (1 pt)

Bonus 1: If I tell you that two solutions to the equation $x^2y'' - 5xy' + 9y = 0$ are of the type $y_1 = x^r$ and $y_2 = x^r \ln x$ (here, the two r's are the same), which are obviously linearly independent, find r and write out the general solution. (2 pts)

Bonus 2: Solve $y'' - 5y' + 6 = 0$ (1 pt) and $2(yy')' - 10yy' + 6y^2 = 0$ (2 pts)

Hint: Note that the first is inhomogeneous and the second is nonlinear! For the first, you can either do substitution $u = y'$ or use the method you'll learn soon and for the second, use substitution $u = y^2$