Math 222 Quiz 8

March 30, 2011

Your Name: *Your Section:*

Instructions: You have 20 minutes to solve the following problems and the total score is 10 points. Bonus problems are tricky.

1. Use the method of undetermined coefficients
   a). $y'' + y = 2x + 3e^x$ (2 pts) b).$y'' + y = \sin x, y(0) = 0, y(\frac{\pi}{2}) = 0$ (3 pts)

2. 3 pts if variation of parameters and 2 pts otherwise.
   $y'' - y = xe^x$ Just in case you need: y_p has the form $Axe^x + Bx^2e^x$

3. a). $ay'' + by' + cy = G(x)$. If y_p is a solution, y is any other solution,then $y - y_p = y_c$ is the solution to the complementary equation. (1 pt)
   b). In a, if $G(x) = G_1(x) + G_2(x)$, y_{p1} solves $ay'' + by' + cy = G_1(x)$ and y_{p2} solves $ay'' + by' + cy = G_2(x)$, then y_p can be chosen to be $y_{p1} + y_{p2}$ (1 pt)

Bonus 1: $y''' - 7y' + 6y = x^2$ (2 pts). Hint: For $y''' - 7y' + 6y = 0$, e^x is a solution, so the aux. equation (which exists since coefficients are constants) has a factor $r - 1$.

Bonus 2:Simple Harmonic Motion: A mass m is attached on a spring that has a spring constant k. Pull the mass with a displacement $y(0) = C$ from equilibrium position O to A' and then release. Supposing no friction, find the equation the displacement $y(t)$ satisfies (1 pt) and the time needed to reach the midpoint of O and A' for the first time. (2 pts)