Differential Equations, Fall 2016 Quiz 8
Name: _____ Section:

You must show all your work to receive credit. Calculators are allowed.

Problem 1: (3 points) Find the general solution to

$$y'' - 5y' + 6y = e^{2t}.$$

Solution: The characteristic equation is $r^2 - 5r + 6 = 0$ and the roots are $r = 2, 3$. Thus the complementary solution is

$$y_c = C_1 e^{2t} + C_2 e^{3t}.$$

Look for y_p of the form

$$y_p = Ate^{2t}.$$

Note that the t appearing here is a correction factor; it is $t = t^1$ because 2 is a root of multiplicity 1 of the characteristic equation. Then

$$\begin{aligned} y_p &= Ate^{2t} \\ y_p' &= (2At + A)e^{2t} \\ y_p'' &= (4At + 4A)e^{2t} \\ y_p'' - 5y_p' + 6y_p &= -Ae^{2t} \end{aligned}$$

Thus $A = -1$ and $y_p = -te^{2t}$. The general solution is

$$y = C_1 e^{2t} + C_2 e^{3t} - te^{2t}.$$