

Quiz 8 - Math 54
October 27, 2010

Name_____

1)[5pts] Find all solutions to the differential equation $y'' - 4y' + 7y = 0$.

The characteristic equation is $r^2 - 4r + 7 = 0$. The solutions to this are $r = \frac{1}{2}(4 \pm \sqrt{16 - 28}) = 2 \pm i\sqrt{3}$. Therefore, any solution to the differential equation is of the form $c_1 e^{2t} \sin(t\sqrt{3}) + c_2 e^{2t} \cos(t\sqrt{3})$.

2)[5pts] Find all solutions to $y''' + 7y'' = 0$, and find a particular solution such that $y(0) = 0$ and $y'(0) = 1$. (Hint: there are infinitely many to choose from, but I just want one)

The characteristic equation is $r^3 + 7r^2 = r^2(r + 7) = 0$, so the general solution is of the form $c_1 e^{-7t} + c_2 e^{0t} + c_3 t e^{0t} = c_1 e^{-7t} + c_2 + c_3 t$. If we take $c_1 = c_2 = 0$ and $c_3 = 1$, we have $y(t) = t$, which satisfies $y(0) = 0$ and $y'(0) = 1$.