MATH 205 Spring 2009 Quiz 3 Name: Answer

1. Solve the following IVP,

$$\begin{cases} y''(t) + 8y'(t) + 16y(t) = 0 \\ y(0) = 2, \quad y'(0) = -3. \end{cases}$$

ch. eq : $r^2 + 8r + 16 = 0 \iff (r+4)^2 = 0$

$\therefore \quad r = -4, -4$ (double root)

$\therefore \quad y = c_1 e^{-4t} + c_2 t e^{-4t}$

$y' = -4c_1 e^{-4t} + c_2 e^{-4t} - 4c_2 t e^{-4t}$

$y(0) = 2 \rightarrow c_1 = 2$

$y'(0) = -3 \rightarrow -4c_1 + c_2 = -3$

$\left.\begin{array}{l} \\ \\ \end{array}\right\} -8 + c_2 = -3$

$\therefore c_2 = 5$

$\therefore \quad y(t) = 2e^{-4t} + 5te^{-4t}$

Answer: $2e^{-4t} + 5te^{-4t}$