

Name _____

KEY

Math 255, Quiz #7, Summer 2012

Instructions: Show all work. Use exact answers unless asked to round.

1. Solve the differential equation $y'' + 4y' + 4y = 13e^{-2t}$ using the method of undetermined coefficients.

$$r^2 + 4r + 4 = 0$$

$$(r+2)^2 = 0$$

$$r = -2$$

$$y_c = Ae^{-2t} + Bte^{-2t}$$

$$y_p = Ct^2e^{-2t}$$

$$y_p' = 2Cte^{-2t} - 2Ct^2e^{-2t}$$

$$y_p'' = 2Ce^{-2t} - 4Cte^{-2t} - 4Cte^{-2t} + 4Ct^2e^{-2t}$$

$$2Ce^{-2t} - 8Cte^{-2t} + 4Ct^2e^{-2t}$$

$$2Ce^{-2t} - 8Cte^{-2t} + 4Ct^2e^{-2t} + 4(2Cte^{-2t} - 2Ct^2e^{-2t}) + 4Ct^2e^{-2t} = 13e^{-2t}$$

$$4Ct^2e^{-2t} - 8Ct^2e^{-2t} + 4Ct^2e^{-2t} = 0 \quad \checkmark$$

$$-8Cte^{-2t} + 8Cte^{-2t} = 0 \quad \checkmark$$

$$2C\cancel{e^{-2t}} = 13\cancel{e^{-2t}}$$

$$C = \frac{13}{2}$$

$$y = Ae^{-2t} + Bte^{-2t} + \frac{13}{2}t^2e^{-2t}$$