NAME & EID: Solutions

M 427K Quiz 5   **October 3, 2012**   **Instructor: James Pascaleff**

- Show all work.

- No books, notes, calculators, or other electronic devices.

This problem is about the second order linear nonhomogeneous ordinary differential equation

$$y'' + 4y = t^2 + 3e^t \tag{1}$$

1. (10 points) Use the method of undetermined coefficients to find a particular solution to this nonhomogeneous equation. (Just one solution is enough.)

Try $Y = At^2 + Bt + C + De^t$

$Y' = 2At + B + De^t$

$Y'' = 2A + De^t$

$Y'' + 4Y = 2A + De^t + 4At^2 + 4Bt + 4C + 4De^t$

$= (4A)t^2 + (4B)t + (2A + 4C) + 5De^t = t^2 + 3e^t$

So $4A = 1 \implies A = 1/4$

$4B = 0 \implies B = 0$

$2A + 4C = 0 \implies C = \frac{1}{4}(-2A) = -\frac{1}{8}$

$5D = 3 \implies D = 3/5$

So $\boxed{Y = \frac{1}{4}t^2 - \frac{1}{8} + \frac{3}{5}e^t}$

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