Math 274 Quiz 4 **Name:** _____

Sections: 4.4,4.5 Point values in boxes.

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Method of Undetermined Coefficients

To find a particular solution to

$$ay'' + by' + cy = P_m(t)e^{rt}$$

where $P_m(t)$ is a polynomial of degree m, use the form

$$y_p(t) = t^s \left(A_m t^m + \cdots + A_1 t + A_0\right) e^{rt};$$

if r is not a root of the associated auxiliary equation, take $s = 0$; if r is a simple root, take $s = 1$; and if r is a double root, take $s = 2$.
To find a particular solution to

$$ay'' + by' + cy = P_m(t)e^{\alpha t}\cos\beta t + Q_n(t)e^{\alpha t}\sin\beta t$$

where $P_m(t)$ and $Q_n(t)$ are polynomials of degree m and n, respectively, use the form

$$y_p(t) = t^s \left(A_k t^k + \cdots + A_1 t + A_0\right) e^{\alpha t}\cos\beta t + t^s \left(B_k t^k + \cdots + B_1 t + B_0\right) e^{\alpha t}\sin\beta t;$$

where k is the larger of m and n. If $\alpha + i\beta$ is not a root of the associated auxiliary equation, take $s = 0$; if so take $s = 1$.

1. [4] Find the appropriate form using the Method of Undetermined Coefficients for a particular solution to the following. **Do not** solve for the unknown constants.

   (a) $y'' - 2y' + y = (3t + 2)e^{3t}$

   (b) $y'' - 2y' + y = 8 - 4e^t$

   (c) $y'' - 2y' + y = 3t\sin t$

   (d) $y'' - 2y' + y = e^t\cos 3t$

2. [1] Find the form of a particular solution to $y'' + y = \sin .9t$. **Do not** solve for the unknown constants. Do solutions of this form stay bounded as $t \to \infty$.

3. [1] Find the form of a particular solution to $y'' + y = \sin t$. **Do not** solve for the unknown constants. Do solutions of this form stay bounded as $t \to \infty$.

4. [4] Find a general solution for the following.

$$y'' - y = 7e^{2t} - t^2$$