KFUPM Term (112) Name_____Serial#_____

MATH 202 Quiz # 3 ID#_____Section_____

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1) Given that $y = c_1 e^t \sin 2t + c_2 e^t \cos 2t$ is a two-parameter family of solutions of the differential equation

$$y'' - 2y' + 5y = 0$$

Determine whether a member of the family of the solutions of the above differential equation can be found that satisfies the boundary conditions:

$$y(0) = 1, \qquad y(\pi) = -1$$

2) Consider the differential equation

$$y'' - 4y' + 4y = 0$$

(a) Find the interval in which the two solutions
$y_1 = e^{2x}$ *and* $y_2 = xe^{2x}$ *are linearly independent.*

(b) Form a general solution of the differential equation

3) Consider the differential equation

$$y'' + 3y = -18e^{3x} \qquad (1)$$

(a) Verify that $y_1 = \cos\sqrt{3}x \text{ and } y_2 = \sin\sqrt{3}x$ are solutions of $y'' + 3y = 0$.

(b) Find a particular solution of the differential equation (1) of the form $y = Ae^{3x}$

(c) Write the general solution of the differential equation (1).

4) Solve the initial value problem

$$y''' + y'' - y' - y = 0; \qquad y(0) = 0, y'(0) = 0, y''(0) = 4$$

5) Given that $y = x^2 + 8x + 33$ is a particular solution to the differential equation

$$y'' + 4y' - y = -x^2 + 1$$

And $y = -\frac{1}{4}xe^{-x} + \frac{1}{8}e^{-x}$ is a particular solution to the differential equation

$$y'' + 4y' - y = xe^{-x} - e^{-x}$$

Find a particular solution to the differential equation

$$y'' + 4y' - y = -x^2 + 1 - 2xe^{-x} + 2e^{-x}$$

6) Find the general solution of the differential equation

$$xy'' - y' + 4x^3y = 0$$

Given that $y_1 = \sin(x^2)$ is a solution