KFUPM, DEPARTMENT OF MATHEMATICS AND STATISTICS

MATH 202 : TEST 3, SEMESTER (151), NOVEMBER 03, 2015

Name : ....

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Exercise 1. Let L be a linear differential operator such that y_{p_1} and y_{p_2} are particular solutions of $L(y) = 11\cos^2(\frac{x}{2})$ and $L(y) = 7\sin^2(\frac{x}{2})$ respectively. Find a particular solution of the DE : $L(y) = \cos x$.

Exercise 2. without solving the differential equation, verify that

$$y = c_1 e^x + c_2 e^{2x} + \sin x$$

is the general solution of the DE :

$$y'' - 3y' + 2y = \sin x - 3\cos x.$$

Exercise 3. Given that $y_1 = x - 1$ is a solution of the DE :

$$(x^2 - 2x + 2)y'' - 2(x-1)\,y' + 2y = 0 \text{ on } \mathbb{R} = (-\infty, \infty),$$

find a second solution y_2 that is linearly independent of y_1.

Exercise 4. Solve the following DE :

$$y^{(4)} + 8y^{(2)} + 16y = 0.$$

Exercise 5. Determine the form of a particular solution for the following DE :

$$(D^2 - 4D + 8)\, y = e^{2x} \sin(2x) + x\, e^{2x}\, cos(2x) x.$$

Exercise 6. Solve the following DE :

$$y'' - 4y' + 3y = \cos(e^{-x}) \quad (*)$$

Exercise 7. Solve the following DE :

$$x^2y'' + xy' - y = \frac{1}{x} \text{ on } I = (0, +\infty).$$