KFUPM, DEPARTMENT OF MATHEMATICS AND STATISTICS

MATH 202 : TEST 4, T 162, 2017

Name : ....

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Exercise 1.

(*a*) Verify that, for $a, b \in \mathbb{R}$, we have

$$\cos(a)\cos(b) = \frac{1}{2}[\cos(a+b) + \cos(a-b)].$$

(*b*) Find a linear differential operator that annihilates the function $f(x) = \cos(2x)\cos(3x)e^{2x}$.

(*c*) Solve the DE : $y'' - y = \cos(2x)\cos(3x)e^{2x}$.

Exercise 2. Solve the following DE :

$$y'' - 2y' + y = \frac{e^x}{2x},$$

on the interval $I = (0, \infty)$.

Exercise 3. Solve the DE :

$$x^3 y^{(3)} - 2xy' = 0.$$

Exercise 4. Find a differential equation with general solution (on the interval $I = (0, \infty)$) :

$$y = c_1 x^{-1} + c_2 x^2 + x - 1,$$

where c_1, c_2 are real parameters.

Exercise 5. Solve the following DE by using the substitution $t = \ln(x)$:

$$x^2y'' - 3xy' + 4y = x\ln(x),$$

on the interval $I = (0, \infty)$.