KFUPM, DEPARTMENT OF MATHEMATICS AND STATISTICS

MATH 202 : TEST 2, (T152), FEBRUARY 18, 2016

Name : ....

ID : ....

Exercise 1. Solve the DE :

$$xy' - 2y - x^2 \ln(x^2) = 0.$$

Exercise 2. Solve the following DE :

$$(3x^2y)\mathrm{dx} + (2x^3)\mathrm{dy} = 0$$

by finding an integrating factor.

Exercise 3. Use an appropriate substitution to transform the following DE :

$$y' = \frac{y + xe^{-y/x}}{x}$$

to a separable DE.

Exercise 4. Use an appropriate substitution to transform the following DE :

$$y' - y = xy^2$$

to a linear DE.

Exercise 5. A ceramic insulator is baked at 400°C and cooled in a room in which the temperature is 25°C. After 4 minutes the temperature of the insulator is 200°C.What is its temperature after 8 minutes ?

Exercise 6. Find the largest open interval containing 1 on which the following IVP :

$$xy'' + (\tan(x))y' + \frac{1}{x - (1/2)}y = x^{2011}, \quad y(1) = 1, y'(1) = 14$$

has a unique solution.

Exercise 7. ;

(1) Verify that $y = c_1 e^x \cos(x) + c_2 e^x \sin(x)$ is a two-parameters family of solutions of the DE :
$$y'' - 2y' + 2y = 0.$$

(2) Determine whether a member of the previous family of solutions can be found that satisfies the boundary conditions $y(0) = 1$, $y'(\pi) = -1$.