KFUPM **Semester 142**

Dept. Math. & Stat. **A.Y:2014/2015**

Test 3 **Tuesday (March 17, 2015)**

Name:…… **ID:……**

Exercise 1:

Find an interval centred at 0 for which the following IVP

$$(x-1)y'' + (\csc(x))y = \sin(x), \quad y(0) = 2, \quad y'(0) = 1$$

has a unique solution.

Solution:

Exercise 2:

Determine wether the functions $f_1(x) = e^x, f_2(x) = \cos(x)$ are linearly independent.

Solution:

Exercise 3:

Let L be a linear differential operator such that y_{p_1} is a particular solution of the DE : $L(y) = e^x$ and y_{p_2} is a particular solution of the DE : $L(y) = e^{-x}$. Find a particular solution of

$$L(y) = \cosh(x).$$

Solution:

Exercise 4:

Check that the function $y_1(x) = x^3$ is a solution of the following DE :

$$x^2y'' - 6y = 0,$$

then solve it.

Solution:

Exercise 5:

Solve the DE :

$$D^2(D-1)^3(D^2-2D+1)^3y=0.$$

Solution: