KFUPM, DEPARTMENT OF MATHEMATICS AND STATISTICS

MATH 202 : TEST 4, SEMESTER (151), DECEMBER 08, 2015

Name : ....

ID : .....

Exercise 1. Determine the ordinary points, regular singular points and irregular singular points of the following DE :

$$y'' + \frac{1}{(x-1)(x+1)^2}y' + \frac{x^2+1}{(x-1)^2(x+1)^3}y = 0.$$

Exercise 2. Explain why $x = 0$ is an ordinary point of the following DE :

$$y'' + xy' - xy = 0.$$

Find two linearly independent power series solutions of the DE.

Exercise 3. Consider the DE :

$$x^2y'' + x\,y' + (x-1)y = 0.$$

(1) Show that $x_0 = 0$ is a regular singular point of the DE.

(2) Find the indicial roots of $x_0 = 0$.

(3) Solve the DE.