KFUPM, DEPARTMENT OF MATHEMATICS AND STATISTICS

MATH 202 : TEST 4, SEMESTER (152), APRIL 21, 2016

Name : ....

ID : ....

Exercise 1. Consider the DE :

$$y'' + y = 0.$$

Let $y = \displaystyle\sum_{n=0}^{\infty} a_n x^n$ be a solution of the given DE.

(1) Find a recursive relation for the coefficients a_n.

(2) Deduce from the recurrence relation the expression of two linearly independent power series solutions.

(3) Explain how can we find explicitly the two previous power series solutions without using the recurrence relation.

Exercise 2. Determine whether $x = 0$ is an ordinary point, a regular singular point, or an irregular singular point of the DE :

$$x^2 y'' + (6 \sin x) y' + 6y = 0.$$

Exercise 3. Use the method of Frobenius to solve the DE :

$$2x^2y'' + 3xy' - (x^2 + 1)y = 0$$

around the regular singular point $x = 0$.