MATHEMATICS 202
SECOND SEMESTER, 2004-05
QUIZ II

Time: 70 MINUTES.

Date: April 23, 2005.

Name:——————————————-

ID Number:————————————

Circle Problem Session Instructor: Dr. A.Lyzzaik, Dr. H. Yamani

Circle Section Number: 13, 14, 15, 16

GRADE:

1.	/4
2.	/8
3.	/8
4.	/6
5.	/6
6.	/10
7.	/8
Total:	/50

1. Use the method of **undetermined coefficients** to find the expected form of a particular solution y_p for the differential equation

$$y'' - 2y' + 5y = e^x \cos 2x.$$

Caution: Need not find y_p explicitly. (4 points)

2. Use the method of **variation of parameters** to find the general solution of the differential equation

$$x^2y'' - xy' + y = x^3.$$

(8 points)

3. Solve by the power series method the initial value problem

$$y'' - 2xy' + 8y = 0, \quad y(0) = 3, y'(0) = 0.$$

(8 points)

4. Find the general solution of the Bessel-type differential equation

$$\frac{d}{dx}(xy') + \left(16x - \frac{1}{x}\right) y = 0; \quad x > 0.$$

(6 points)

5. Use the substitution $x = e^t$ to find the general solution of the differential equation

$$xy''' - \frac{6}{x^2}y = 0; \quad x > 0.$$

(6 points)

6. Show that the differential equation

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

has indicial roots $r = 0, 1/3$. Derive the recurrence relation of the coefficients of the series solution of the equation associated with $r = 1/3$.

(4+6=10 points)

7. Answer TRUE (T) or FALSE (F) only:

(a) ——- The differential equation

$$y'' + P(x)y' + Q(x)y = 0,$$

has at least one power series solution near a regular singular point x_0.
(2 points)

(b) ——- The differential equation

$$y'' + P(x)y' + Q(x)y = 0$$

has a fundamental set of power series solutions near an ordinary point x_0.
(2 points)

(c) ——- The differential equation

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

has no irregular singular points. (2 points)

(d) ——- The interval of convergence of series solutions of the differential equation

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

about the regular singular point $x = 0$ is $]0, \infty[$. (2 points)