

MATHEMATICS 202
SECOND SEMESTER, 2004-05
QUIZ 1

Time: 55 MINUTES.

Date: March 23, 2005.

Name: _____

ID Number: _____

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

Circle Section Number: 15, 16, 17, 18, 19

GRADE:

1.

2.

3.

4.

5.

6.

Total: /50

1. Solve the initial-value problem

$$\frac{dy}{dx} = 1 + e^{y-x+5}, \quad y(6) = 1.$$

(8 points)

2. Solve the differential equation

$$x^2 \frac{dy}{dx} - 2xy = 3y^4.$$

(8 points)

3. Solve the initial value problem

$$(x^2 + y^2 + xy) dx - xy dy = 0 \quad y(1) = e - 1.$$

(8 points)

4. Find the general solution of the differential equation

$$4x^2y'' + y = 0$$

for $x > 0$ if one of the solutions is $y_1 = x^{1/2} \ln x$. (8 points)

5. Find the general solution of the differential equation

$$y''' + 6y'' + y' - 34y = 0.$$

(8 points)

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

(a) ——— The set of functions $\{x^2, x|x|\}$ on $] - \infty, \infty[$ is linearly independent. (2 points)

(b) ——— An initial-value problem

$$\frac{dy}{dx} = f(x, y), y(x_0) = y_0$$

has a unique solution if $f(x, y)$ and $f_x(x, y)$ are continuous in the xy -plane. (2 points)

(c) ——— A set $\{y_1, y_2\}$ of solutions of $y'' + y' + y = 0$ on $] - \infty, \infty[$ is linearly independent if and only if the Wronskian $W(y_1, y_2)$ is nonzero at some $x \in] - \infty, \infty[$. (2 points)

(d) ——— The initial-value problem

$$(x^2 + 1)y'' + xy' + y = 0 \quad y(0) = y'(0) = 0$$

has the unique solution $y = 0$ on $] - \infty, \infty[$. (2 points)

(e) ——— The differential equation

$$(\cos x \sin x - xy^2) dx + y(1 - x^2) = 0$$

is exact. (2 points)