

Not To Be Taken Out  
Reserve Reading Room

**MATHEMATICS 202**  
**SPRING SEMESTER 2004**  
**QUIZ I**

Instructors: Ms. S. Jaafar, Dr. Abdallah Lyzzaik, Dr. Husam Yamani

Date: March 18, 2004

Time: 60 MINUTES

**Answer the following five questions:**

1. Solve the initial-value problem (10 points)

$$(x + 2y + 1)dx - (2x + 4y + 8)dy = 0, \quad y(0) = -1.$$

2. Solve the differential equation (10 points)

$$x \frac{dy}{dx} = y - x \cos^2\left(\frac{y}{x}\right), \quad x > 0.$$

3. Solve the initial-value problem (10 points)

$$(2y - 4x^4y^4)dx + x dy = 0, \quad y(1) = 1/7.$$

4. Solve the differential equation (10 points)

$$(y + y^2 \cos x)dx + (2x + 3y \sin x)dy = 0, \quad y > 0.$$

5. (a) State the existence and uniqueness theorem for the initial-value problem (4 points)

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

- (b) Determine the largest region of the  $xy$ -plane for which the differential equation (6 points)

$$\frac{dy}{dx} = \frac{1}{2} \left( \frac{x}{y} + \frac{y}{x} \right)$$

would have a unique solution whose graph passes through a point  $(x_0, y_0)$  in the region. Find, by inspection, the solution passing through any point  $(x, x)$ ,  $x \neq 0$ .