MATHEMATICS 202
SPRING SEMESTER 2005-06
QUIZ I

Time: 70 MINUTES.

Date: March 11, 2006.

Name:————————————————————————————-

ID Number:————————————————————————

Section Number:———————————————————————

Course Instructors: Prof. Abdallah Lyzzaik and Dr. Hassan Yamani

Question	Grade
1	/14
2	/14
3	/14
4	/14
5	/14
6	/12
7	/18
TOTAL	/100

Answer The Following Seven Questions On The Page Allocated For Each Question (You May Use The Back Of The Pages If Needed).

1. Solve the initial-value problem (14 points)

$$\frac{dy}{dx} = \frac{y^2 - x^2}{yx}, \qquad y(1) = -\sqrt{2}.$$

2. Solve the differential equation (14 points)

$$(y^3 + x + 1)\,dx + 3y^2\,dy = 0$$

by finding an appropriate integrating factor to make it exact.

3. Solve the initial-value problem (14 points)

$$(3x - y^2)\,dx - 4xy\,dy = 0, \qquad y(1) = 2.$$

4. Solve the differential equation (14 points)

$$(x+y)^2 \frac{dy}{dx} = 1.$$

5. Find the general solution of the differential equation (14 points)

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

provided that $y = x$ is a known solution.

6. Sketch the regions in the $xy-$plane for which the initial-value problem

$$\frac{dy}{dx} = \sqrt{\frac{x^2-1}{1-y^2}}, \qquad y(x_0) = y_0.$$

possesses real and unique solutions; justify your answer. (12 points)

7. The differential equation

$$x^2y'' - 4xy' + 6y = 0$$

is known to have solutions $y_1 = x^2$ and $y_2 = x^3$.

(a) Show that the Wronskian $W(y_1, y_2) = 0$ for every real x.

(6 points)

(b) Show that the set $\{y_1, y_2\}$ is linearly independent on $(-\infty, \infty)$.
(6 points)

(c) Do the results in (a) and (b) contradict? Justify your answer.
(6 points)