KING FAHD UNIVERSITY OF PETROLEUM & MINERALS
Department of Mathematical Sciences

Math 260  Linear Algebra & Differential Equations
Major Exam # 1  Term 042

Time Allowed 90 minutes

Name __________________  ID # _______  Section # _____

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Important Note

Show all work.
Use of programmable calculator is not allowed.
Mobiles and paging devices should not be carried during examination.

Instructor: A. H. Bokhari
Q1) Solve the following differential equations by the indicated method:

(a) \( \sin x (e^{xy} - y) \frac{dy}{dx} = e^y \cos x \) (separation of variables)
Q 1)(b) \((x^2 - 1) \frac{dy}{dx} + 2xy = 3x, \quad y(0) = 1.\) (linear differential equation) (3)
Q2) Reduce the following to a DE with homogeneous coefficients and solve
\[
\frac{dy}{dx} = \frac{x - y + 1}{x + y}
\]
Q 3) Solve the following problem

\[ x^2 \frac{dy}{dx} - 2xy = 3y^4, \quad y(1) = 1. \]
Q 4) Solve the system of equations

\[
\begin{align*}
    x_1 + x_4 &= 3 \\
    2x_2 + x_3 &= 5 \\
    4x_1 - 2x_3 &= 6 \\
    2x_1 + 2x_2 - x_3 - 2x_4 &= 5
\end{align*}
\]
Q5) Show that the following system has no solution. (3)
\[
\begin{align*}
5x_1 & + 2x_2 + 18x_3 = 2 \\
x_2 & + 4x_3 = 4 \\
4x_1 & + x_2 + 12x_3 = 1
\end{align*}
\]