Course Code:MT1004	Course Name: Linear Algebra
Instructor Names: Ms. Amber Shaikh and Ms. Alishba Tariq	
Student Roll No:	Section No:

Instructions:

- Solve all questions and return the question paper.
- Read each question completely before answering it. There are 4 questions and 2 pages.
- Use pen for solution.

Time: 60 minutes.   **Total Marks:**30

Qno1 –   **5 Marks**

Solve by Cramer's rule

$$4x_2 - x_1 - x_3 = -6$$
$$-x_2 + 4x_1 + 2x_3 = -1$$
$$2x_2 + 2x_1 - 3x_3 = -20$$

Q no 2-   **(5+5) Marks**

a) Let V=R^2 with addition and scalar multiplication as follows.

$$u + v = (u_1, u_2) + (v_1, v_2) = (u_1 + v_1 + 1, u_2 + v_2 + 2)$$
$$ku = k(u_1, u_2) = (ku_1, -ku_2)$$

Determine whether **V** equipped with the given operations is a vector space.

b) Q no 4- Let $T_A : R^3 \to R^2$ be multiplication by A. and let $u_1 = (0,1,1)$, $u_2 = (2,-1,1)$ and $u_3 = (0,1,1)$. Determine whether the set $\{T_A(u_1), T_A(u_2), T_A(u_3)\}$ spans R^2.
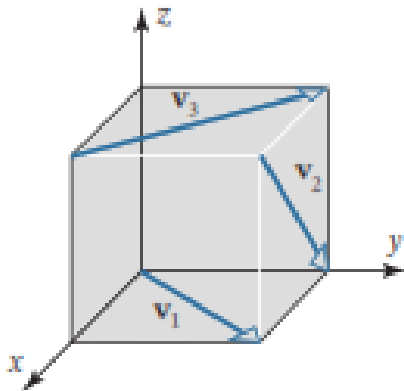
$$A = \begin{bmatrix} 1 & 1 & 0 \\ 0 & 1 & -1 \end{bmatrix}$$

For A=$\begin{bmatrix} 1 & -4 & 5 & 3 & 1 \\ 2 & -8 & 9 & 4 & 0 \\ 1 & -4 & 3 & -9 & -3 \\ -1 & 4 & -2 & 4 & 5 \end{bmatrix}$

a) Find basis of Row(A) b) Find basis of Col(A)
c) Find basis of Null(A) d) Find rank(A) and Nullity(A^T)

a)Determine whether the vectors v_1, v_2 and v_3 are linearly dependent? Give reason of your choice.

b) Find dim(P_5).

c) Find the number of parameters in the general solution of AX=0 if A is a 5x7 matrix of rank 3.

d) C_{33} (*Cofactor*) of the given matrix will be $\begin{bmatrix} 4 & 0 & 1 \\ -2 & 1 & 0 \\ -2 & 0 & 1 \end{bmatrix}$.

e) What will be the span of two linearly independent vectors in R^3 ?

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