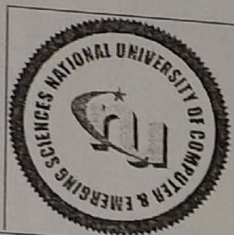


# National University of Computer and Emerging Sciences, Lahore Campus



Course: Linear Algebra  
 Program: BS (CS, DS, SE)  
 Duration: 60 Minutes  
 Paper Date: 19-Oct-21  
 Section: ALL  
 Exam: Midterm-I

Course Code: MT1004  
 Semester: Fall 2021  
 Total Marks: 30  
 Weight: 12.5%  
 Page(s): 1  
 Roll No: 20L-1080

Instruction/Notes: Programmable calculators are not allowed.

**Question # 1(a) [5]:** Suppose three households in your neighborhood performed holy sacrifice this Eid. The 1<sup>st</sup> household sacrificed 2 cows, 4 lambs and 1 camel. The 2<sup>nd</sup> household sacrificed 1 cow, 3 lambs and 1 camel. The 3<sup>rd</sup> household sacrificed 3 cows, 5 lambs and 1 camel. If the first household spent total Rs. 9, 00, 000, second household spent Rs. 6,50,000 and third household spent Rs. 11,50,000. Use **Gauss Jordan Elimination** to determine how much each cow, lamb and camel cost?

✓ **Question # 1(b) [5]:** Suppose that the **Augmented matrix** of a linear system of equations has been reduced by row operations to the given **Row Echelon** form. By inspection find the solution of the system from the given form.

$$\begin{bmatrix} 1 & 7 & -2 & 0 & -8 & -3 \\ 0 & 0 & 1 & 1 & 6 & 5 \\ 0 & 0 & 0 & 1 & 3 & 9 \\ 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$$

**Question # 2 [10]:** Determine condition(s) on  $b_i$ 's, if any, in order to guarantee that the linear system is consistent

$$\begin{aligned} x_1 - 2x_2 - x_3 &= b_1 \\ 2x_1 + 5x_2 + 2x_3 &= b_2 \\ -3x_1 + 7x_2 + 4x_3 &= b_3 \end{aligned}$$

✓ **Question # 3 [6+4]:** Use Inverse Algorithm (By Elementary Row Operations) to find the inverse of the matrix A. Also, express B as a product of the elementary matrices.

$$A = \begin{bmatrix} 1 & 2 & 3 \\ 2 & 5 & 3 \\ 1 & 0 & 8 \end{bmatrix}, B = \begin{bmatrix} 1 & 2 \\ 2 & 5 \end{bmatrix}$$