

# National University of Computer and Emerging Sciences, Lahore Campus



Course: Linear Algebra  
Program: BSE  
Duration: 15 minutes  
Paper Date: 12-02-2024  
Section:  
Exam: Quiz-1

Course Code: MT-1004  
Semester: Spring 2024  
Total Marks: 15  
Weight: 3.3%  
Page(s): 2

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Question 1: (10 marks) Determine whether the following statements are true or false. 5  
Justify your answer (No mark will be awarded without justification)

i. If  $A = \begin{bmatrix} 5 & 1 & 5 & 9 \\ 1 & 1 & 8 & 5 \\ 0 & 2 & 2 & 1 \end{bmatrix}$  and  $B = \begin{bmatrix} 5 & 1 & 5 & 9 \\ 1 & -1 & 6 & 4 \\ 0 & 2 & 2 & 1 \end{bmatrix}$  are row equivalent.

**True** ✓  
 $R_2 - R_3$  on A

~~As  $R_3$  of A is equal to  $R_3$  of B.~~

ii.  $A = \begin{bmatrix} 0 & 2 & -1 \\ -2 & 0 & 0 \\ 1 & 0 & 1 \end{bmatrix}$  is skew symmetric.

**False**

$$\begin{matrix} 0 & +2 & -1 \\ -2 & 0 & 0 \\ +1 & 0 & -1 \end{matrix}$$

$A \neq -A^T$ , in  $R_3$  the element at  $A_{33}$  don't match.

iii. If A is invertible then the system  $Ax = b$  may have infinitely many solutions. **False**  
If A is invertible then  $|A| \neq 0$  and it has only one trivial solution.

iv. If  $A = \begin{bmatrix} 2a & b & c \\ d & 10e & f \\ g & h & 3i \end{bmatrix}$  then  $\text{tr}(A) = 60aei$ .

**True**

As we can see by multiplying the main diagonal we get  $60aei$ .

v. Following system will be consistent regardless the value of  $k$ .

**False**

$$2x + 3y = 5$$

$$2x + 3y = k$$

This system will be consistent if and only if  $k = 5$ .

Question 2: (CLO 2) (5 marks) Use the inverse of the matrix to solve the following system.

$$\begin{aligned} x_1 - x_2 + x_3 + 2x_4 &= 0 \\ -2x_1 + x_2 + 5x_3 + x_4 &= 0 \\ -3x_1 + 2x_2 + 2x_3 - x_4 &= 0 \\ 4x_1 - 3x_2 + x_3 + 3x_4 &= 0 \end{aligned}$$

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Let  $T = \begin{bmatrix} 1 & -1 & 1 & 2 & 0 \\ -2 & 1 & 5 & 1 & 0 \\ -3 & 2 & 2 & -1 & 0 \\ 4 & -3 & 1 & 3 & 0 \end{bmatrix}$

$$R_2 = R_2 + 2R_1$$

$$R_3 = R_3 + 3R_1$$

$$R_4 = R_4 + (-4R_1)$$