

Third Semester Internal Examination, September 2025
 Major Course in Mathematics
 Matrix Algebra
 MAT3CJ202

Max Marks: 35

Time: 1 Hr

Name: Class:	Marks Scored	Section A		Total Marks
		Section B		
		Section C		

Section A

(Each question carries 3 marks, Max marks for section - 7)

1. Write all elementary row operations
2. If a matrix A is 5×3 and the product AB is 5×7 , what is the size of B ?
3. Find the inverse of $A = \begin{bmatrix} 3 & 4 \\ 5 & 6 \end{bmatrix}$.

Section B

(Each question carries 6 marks, Max marks for section - 18)

4. Determine whether the following system is consistent

$$\begin{aligned} x_2 - 4x_3 &= 8, \\ 2x_1 - 3x_2 + 2x_3 &= 1, \\ 5x_1 - 8x_2 + 7x_3 &= 1. \end{aligned}$$

5. For what values of h will Y be in the span $\{v_1, v_2, v_3\}$ if

$$v_1 = \begin{bmatrix} 1 \\ -1 \\ -2 \end{bmatrix}, \quad v_2 = \begin{bmatrix} 5 \\ -4 \\ -7 \end{bmatrix}, \quad v_3 = \begin{bmatrix} -3 \\ 1 \\ 0 \end{bmatrix} \quad \text{and} \quad Y = \begin{bmatrix} -4 \\ 3 \\ h \end{bmatrix}$$

6. Find the inverse of the matrix $A = \begin{bmatrix} 0 & 1 & 2 \\ 1 & 0 & 3 \\ 4 & -3 & 8 \end{bmatrix}$, if it exists.

7. Let $A = \begin{bmatrix} 1 & -3 & -4 \\ -4 & 6 & -2 \\ -3 & 7 & 6 \end{bmatrix}$ and $\mathbf{b} = \begin{bmatrix} 3 \\ 3 \\ -4 \end{bmatrix}$. Determine whether \mathbf{b} is in the column space of A .

Section C

(Answer any one question, Each question carries 10 marks)

8. (a) Solve

$$x_1 + 3x_2 + 4x_4 + 2x_5 = 0,$$

$$x_3 + 2x_4 = 0,$$

$$x_6 = \frac{1}{3}.$$

- (b) Find the row reduced echelon form of $\begin{bmatrix} 1 & 1 & 2 & 9 \\ 2 & 4 & -3 & 1 \\ 3 & 6 & -5 & 0 \end{bmatrix}$

9. (a) Define null space and basis

- (b) Find a basis for the null space of the matrix

$$A = \begin{bmatrix} -3 & 6 & -1 & 1 & -7 \\ 1 & -2 & 2 & 3 & -1 \\ 2 & -4 & 5 & 8 & -4 \end{bmatrix}$$