

CS603 Mathematical Concepts in Computer Science

Problem-Set-Matrices-2

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1. Give an upper bound on the rank of an $m \times n$ matrix. Justify.
2. Is the matrix $\begin{bmatrix} -1 & i \\ -i & 3 \\ 1 & 2 \end{bmatrix}$ a row reduced echelon matrix ?. Write down the equivalent row-reduced echelon matrix.
3. Let $A = \begin{bmatrix} -1 & i \\ -i & 3 \\ 1 & 2 \end{bmatrix}$, list the solutions of the system $AX = 0$.
4. Simplify using elementary row operations. Find Inverse, if it exists. Find a solution set ?

$$x - 2y + z = 2$$

$$2x + y - z = 3$$

$$3x - y = 5$$

5. Is every row reduced matrix a row reduced echelon matrix ? What can you say about Null Matrix ?
6. Check the consistency of the following equations. Also list the solution set.

$$x + 2y + 3z = 3$$

$$2x + 3y + 8z = 4$$

$$3x + 2y + 17z = 1$$

7. Solve the following system of equations by matrix method. Check the consistency of the system. Find inverse by augmenting an Identity matrix, if it exists.

$$2x + 8y + 5z = 5$$

$$x + y + z = -2$$

$$x + 2y - z = 2$$

8. Use matrix method to examine the following system of equation for consistency or inconsistency ?

$$2x + 5y = 7$$

$$6x + 15y = 13$$

9. Given that $AX = 0$, where A is a square matrix. List the criterion of consistency regarding solution to $AX = 0$.
10. Solve. Find Inverse.

$$8x + 4y + 3z = 18$$

$$2x + y + z = 5$$

$$x + 2y + z = 5$$

11. Test for consistency of the equations

$$4x - 5y - 2z = 2$$

$$5x - 4y + 2z = -2$$

$$2x + 2y + 8z = -1$$

12. Check whether the following system of homogeneous equations has a non-trivial solutions

$$2x + 3y - z = 0$$

$$x - y - 2z = 0$$

$$3x + y + 3z = 0$$

13. Check whether the following system of homogeneous equations has a non-trivial solutions

$$x + y - 2z = 0$$

$$2x + y - 3z = 0$$

$$5x + 4y - 9z = 0$$