



Subject: Numerical methods

Chapter: Matrices

Category: Practice questions

1. Perform the following:

$$\begin{pmatrix} 5 & 2 \\ 4 & 9 \\ 10 & -3 \end{pmatrix} + \begin{pmatrix} -11 & 0 \\ 7 & 1 \\ -6 & -8 \end{pmatrix}$$

$$\begin{pmatrix} 7 & 3 \\ 5 & 9 \\ 11 & -2 \end{pmatrix} - \begin{pmatrix} -3 & 0 \\ 8 & 1 \\ -3 & -4 \end{pmatrix}$$

2. If A is a symmetric matrix then find the value of x

$$A = \begin{bmatrix} 3 & x-1 \\ 2x+3 & x+2 \end{bmatrix}$$

3. Find the values of x, y and z from the following:

$$\begin{bmatrix} x & 3x-y \\ 2x+z & 3y-w \end{bmatrix} = \begin{bmatrix} 3 & 2 \\ 4 & 7 \end{bmatrix}$$

4. Find the matrix A if:

$$\begin{bmatrix} 9 & -1 & 4 \\ -2 & 1 & 3 \end{bmatrix} = A + \begin{bmatrix} 1 & 2 & -1 \\ 0 & 4 & 9 \end{bmatrix},$$

5. Solve the following equation and find the value of x:

$$\begin{bmatrix} 2 & -3 \\ 1 & 1 \end{bmatrix} \begin{bmatrix} x \\ 4 \end{bmatrix} = \begin{bmatrix} 1 \\ 3 \end{bmatrix}$$

6. Calculate, if possible, the product of D and F.

$$D = \begin{bmatrix} 6 & -2 \\ 3 & 7 \end{bmatrix} \quad F = \begin{bmatrix} 1 & -2 \\ -3 & 4 \end{bmatrix}$$

7. Find the determinant of the following matrix and check if the matrix is singular:

$$\begin{bmatrix} 0 & a-b & k \\ b-a & 0 & 5 \\ -k & -5 & 0 \end{bmatrix}$$

$$A = \begin{bmatrix} 3 & 8 & 1 \\ -4 & 1 & 1 \\ -4 & 1 & 1 \end{bmatrix}$$

INSTITUTE OF ACTUARIAL
& QUANTITATIVE STUDIES

8. For the following matrix find its transpose and state whether it is symmetric, skew-symmetric or neither.

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

9. For the following system of equations convert the system into an augmented matrix and use the augmented matrix techniques to determine the solution to the system.

$$2x + 5y + 2z = -38$$

$$3x - 2y + 4z = 17$$

$$-6x + y - 7z = -12$$

10. Find matrix X, if $AX=B$, where

$$A = \begin{bmatrix} 1 & 2 & 3 \\ -1 & 1 & 2 \\ 1 & 2 & 4 \end{bmatrix} \quad B = \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}$$

11. Find the inverse of following matrix:

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

12. Use the method of cofactors to find the inverse of the following matrix:

$$A = \begin{bmatrix} -1 & 0 & 3 \\ 3 & 2 & 2 \\ 0 & 0 & 1 \end{bmatrix}$$

13. The bookshop of a particular school has 10 dozen chemistry books, 8 dozen physics books, 10 dozen economic books. Their selling prices are rs 80, rs 60 and rs 40 each respectively. Find the total amount the bookshop will receive from selling all the books (using matrix algebra).

14. Find all eigenvalues and corresponding eigenvectors for the matrix A if:

$$A = \begin{bmatrix} 2 & -3 & 0 \\ 2 & -5 & 0 \\ 0 & 0 & 3 \end{bmatrix}$$

15. The total cost of 3 T.V and 2 V.C.R is rs 35000. The shopkeeper wants profit of rs 1000 per television and rs 500 per V.C.R He can sell 2 T.V and 1 V.C.R and get the total revenue as rs 21500. Find the cost price and selling price of a T.V and a V.C.R.

16. Find the inverse of the following matrix by transformation method:

$$\begin{bmatrix} 2 & 0 & -1 \\ 5 & 1 & 0 \\ 0 & 1 & 3 \end{bmatrix}$$