

CLASS – XII

MATHEMATICS

ASSIGNMENT NO. 1

MATRICES

- Q1(i) If a matrix has 12 elements, what are the possible orders it can have ? What if it has 7 elements?
 (ii) If a matrix has 8 elements, what are the possible orders it can have? What if it has 5 elements?
 Q2. Construct a 2×3 matrix whose elements in the i^{th} row and j^{th} column is given by :-
 (i) $a_{ij} = \frac{i+3j}{2}$ (i) $a_{ij} = \frac{2i+3j}{2}$ (iii) $a_{ij} = \frac{3i+j}{2}$ (iv) $a_{ij} = \frac{3i-j}{2}$

Q3. Construct a 4×3 matrix whose elements are:-

- (i) $a_{ej} = 2i + \frac{e^j}{f}$ (ii) $a_{ej} = \frac{i-j}{j+j}$ (iii) $a_{ej} = i$

Q4. If
$$\begin{pmatrix} 2+3 & 2+4 & 2y-7 \\ 4x+6 & a-1 & 0 \\ b-3 & 3b & z=2c \end{pmatrix} = \begin{pmatrix} 0 & 6 & 3y-2 \\ 2x & -3 & 2c-2 \\ 2b+4 & -21 & 0 \end{pmatrix}$$

Obtain the values of a, b, c, x, y and z.

Q5. Find matrices x and y i.e.

$$2x-y = \begin{pmatrix} 6 & -6 & 0 \\ -4 & 2 & 1 \end{pmatrix} \quad \text{and } x+2y = \begin{pmatrix} 3 & 2 & 5 \\ -2 & 1 & -7 \end{pmatrix}$$

Q6. Find the value of x such that :-

$$\begin{bmatrix} 1 & 1 & x \end{bmatrix} \begin{pmatrix} 1 & 0 & 2 \\ 0 & 2 & 1 \\ 2 & 1 & 0 \end{pmatrix} \begin{pmatrix} 1 \\ 1 \\ 1 \end{pmatrix} = 0$$

Q7. If $A = \begin{pmatrix} 3 & -4 \\ 1 & -1 \end{pmatrix}$ prove that $A^n = \begin{pmatrix} 1+2n & -4n \\ n & 1-2n \end{pmatrix}$ where n is any positive integer.

Q8. If $A = \begin{pmatrix} 1 & 2 & 0 \\ 3 & -4 & 5 \\ 0 & -1 & 3 \end{pmatrix}$, find $A^2 - 4A + 3I_3$

Q9. Express the matrix $A = \begin{pmatrix} 4 & 2 & -1 \\ 3 & 5 & 7 \\ 1 & -2 & 1 \end{pmatrix}$ as the sum of a symmetric and a skew symmetric matrix

Q10. Express the following matrices as the sum of symmetric and skew-symmetric matrices:-

(i) $A = \begin{pmatrix} 6 & 1 \\ 3 & 4 \end{pmatrix}$ (ii) $A = \begin{pmatrix} 3 & 2 & 3 \\ 4 & 5 & 3 \\ 2 & 4 & 5 \end{pmatrix}$

(iii) $A = \begin{pmatrix} 2 & 3 & -1 \\ -1 & 4 & 2 \\ 6 & 0 & 8 \end{pmatrix}$ (iv) $A = \begin{pmatrix} 6 & 1 & -5 \\ -2 & -5 & 4 \\ -3 & 3 & -1 \end{pmatrix}$

Q11. Using elementary transformation, find the inverse of the following matrices :-

(i) $\begin{pmatrix} 2 & 0 & -1 \\ 5 & 1 & 0 \\ 0 & 1 & 3 \end{pmatrix}$ (ii) $\begin{pmatrix} 0 & 1 & 2 \\ 1 & 2 & 3 \\ 3 & 1 & 1 \end{pmatrix}$ (iii) $\begin{pmatrix} 2 & -3 & 3 \\ 1 & 5 & 9 \\ 6 & 4 & 7 \end{pmatrix}$

(iv) $\begin{pmatrix} 3 & -1 & -2 \\ 2 & 0 & -1 \\ 3 & -5 & 0 \end{pmatrix}$

Determinants

Evaluate

1. $\begin{pmatrix} 9 & 9 & 12 \end{pmatrix}$ 2. $\begin{pmatrix} 265 & 240 & 219 \end{pmatrix}$ 3. $\begin{pmatrix} 3 & -4 & 5 \end{pmatrix}$

$$4. \begin{pmatrix} 1 & -3 & -4 \\ 1 & 9 & 12 \\ 4 & 9 & 16 \\ 9 & 16 & 25 \end{pmatrix} \quad \begin{matrix} 240 & 225 & 198 \\ 219 & 198 & 181 \end{matrix} \quad \begin{matrix} 1 & 1 & -2 \\ 2 & 3 & 1 \end{matrix}$$

Using properties of determinants, prove that :-

$$1. \begin{vmatrix} 1 & 1 & 1 \\ a & b & c \\ bc & ca & ab \end{vmatrix} = (a-b)(b-c)(c-a) \quad 2. \begin{vmatrix} 1 & a & a^2 \\ 1 & b & b^2 \\ 1 & c & c^2 \end{vmatrix} = (a-b)(b-c)(c-a)$$

$$3. \begin{vmatrix} 1 & 1 & 1 \\ 1 & 1-x & -1 \\ 1 & 1 & 1+y \end{vmatrix} = x y \quad 4. \begin{vmatrix} a+2a & 2a+1 & 1 \\ 2a+1 & a+2 & 1 \\ 3 & 2 & 1 \end{vmatrix} = -2(x^3+y^3)$$

$$5. \begin{vmatrix} x & y & x+y \\ y & x+y & x \\ x+y & x & y \end{vmatrix} = -2(x^3+y^3) \quad 6. \begin{vmatrix} a & b & c \\ a^2 & b^2 & c^2 \\ a^3 & b^3 & c^3 \end{vmatrix} = abc(a-b)(b-c)(c-a)$$

$$7. \begin{vmatrix} a & b-c & c+b \\ a+c & b & c-a \\ a-b & a+b & c \end{vmatrix} = (a+b+c)(a^2+b^2+c^2)$$

$$8. \begin{vmatrix} x & x^2 & 1+px^3 \\ y & y^2 & 1+py^3 \\ z & z^2 & 1+pz^3 \end{vmatrix} = (1+pxyz)(x-y)(y-z)(z-x), \text{ where } p \text{ is a scalar.}$$

Q9. Find the area of the triangle whose vertices are A(-2, -3), B(3,2) and C (-1, -8)

Q10. Show that the pts A(a+b+c), B(b+c+a) and C (c+a+b) are collinear. Find the inverse of each of the matrices given below :-

$$Q11. \begin{vmatrix} 3 & -5 \\ -1 & 2 \end{vmatrix} \quad Q12. \begin{vmatrix} 1 & 2 & 5 \\ 1 & -1 & -1 \\ 2 & 3 & -1 \end{vmatrix} \quad Q13. \begin{vmatrix} 2 & -1 & -1 \\ 3 & 0 & -1 \\ 2 & 6 & 0 \end{vmatrix}$$

$$Q14. \begin{vmatrix} 2 & -3 & 3 \\ 2 & 2 & 3 \\ 3 & -2 & 2 \end{vmatrix} \quad Q15. \begin{vmatrix} 8 & -4 & 1 \\ 10 & 0 & -6 \\ 8 & 1 & 6 \end{vmatrix}$$

$$Q16. \begin{matrix} 5x+2y = 4 \\ 7x+3y = 5 \end{matrix} \quad Q17. \begin{matrix} 3x+4y-5 = 0 \\ x-y+3 = 0 \end{matrix} \quad Q18. \begin{matrix} 3x-2y+3z = 8 \\ 2x+y-z = 1 \\ 4x-3y+2z = 4 \end{matrix}$$

$$Q19. \begin{matrix} x-y+z = -1 \\ 2x+y-z = 2 \\ x-2y-z = 4 \end{matrix} \quad Q20. \begin{matrix} x+y+z = 4 \\ 2x-y+z = -1 \\ 2x+y-3 = -9 \end{matrix} \quad Q21. \begin{matrix} 4x+2y+3z = 5 \\ x-2y+z = -4 \\ 3x-y-2z = 3 \end{matrix}$$

$$Q22. \begin{matrix} 4x+2y+3z = 9 \\ X+y+z = 1 \\ 3x+y-2z = 1 \end{matrix} \quad Q23. \begin{matrix} 3x-4y+2z = -1 \\ 2x+3y+5z = 7 \\ x+z = 2 \end{matrix} \quad Q24. \begin{matrix} 6x-9y-20z = -4 \\ 4x-15y+10z = -1 \\ 2x-3y-5z = -1 \end{matrix}$$

Q25. $5x - y = 7$
 $2x + 3z = 1$

Q28. If $A = \begin{vmatrix} 2 & -3 \\ 3 & 2 \\ 1 & 1 \end{vmatrix}$ find A^{-1}

Using A^{-1} solve the foll. System of equations

$$2x - 3y + 5z = 11$$

$$3x + 2y - 4z = -5$$

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

Q26. $2x + y - z = 1$
 $x - y + z = 2$
 $3x + y - 2z = -1$

Q27. $x - y = 3$
 $2x + 3y + 4z = 17$
 $3y - z = 5$