**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 2x3 matrix whose elements in the $e^{th}$ row and $j^{th}$ column is given by :-

(i) aij = $\frac{i+3j}{2}$ (i) aij = $\frac{2i+3j}{2}$ (iii) aij = $\frac{3i+j}{2}$ (iv) aij = $\frac{3i-j}{2}$

Q3. Construct a 4x3 matrix whose elements are:-

(i) aej = $2i+\frac{e'}{f}$ (ii) aej = $\frac{i-j}{j+j}$ (iii) aej = 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 :-

$$[1 \quad 1 \quad x] \begin{pmatrix} 1 & 0 & 2 \\ 0 & 2 & 1 \\ 2 & 1 & 0 \end{pmatrix} \begin{pmatrix} 1 \\ 1 \\ 1 \end{pmatrix} = 0$$

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 $A^2 - 4A + 3I3$

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) $\begin{pmatrix} 6 & 1 & -5 \\ -2 & -5 & 4 \\ -3 & 3 & -1 \end{pmatrix}$

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

<u>Determinants</u>

Evaluate

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

$$\begin{matrix} 1 & -3 & -4 \\ 1 & 9 & 12 \end{matrix} \qquad \begin{matrix} 240 & 225 & 198 \\ 219 & 198 & 181 \end{matrix} \qquad \begin{matrix} 1 & 1 & -2 \\ 2 & 3 & 1 \end{matrix}$$

4. $\begin{pmatrix} 1 & 4 & 9 \\ 4 & 9 & 16 \\ 9 & 16 & 25 \end{pmatrix}$

Using properties of determinants, prove that :-

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

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

3. $\begin{vmatrix} 1 & 1 & 1 \\ 1 & 1-x & -1 \\ 1 & 1 & 1+y \end{vmatrix} = x\ y$

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

5. $\begin{vmatrix} x & y & x+y \\ y & x+y & x \\ x+y & x & y \end{vmatrix} = -2(x^3+y^3)$

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. $\begin{vmatrix} x & x^2 & 1+px^3 \\ y & y^2 & 1py^3 \\ z & z^2 & 1+pz^3 \end{vmatrix} = (1+pxyz)(x-y)(y-z)(z-x)$, where p 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. $\begin{vmatrix} 3 & -5 \\ -1 & 2 \end{vmatrix}$

Q12. $\begin{vmatrix} 1 & 2 & 5 \\ 1 & -1 & -1 \\ 2 & 3 & -1 \end{vmatrix}$

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

Q14. $\begin{vmatrix} 2 & -3 & 3 \\ 2 & 2 & 3 \\ 3 & -2 & 2 \end{vmatrix}$

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

Q16. $5x+2y = 4$
$7x+3y = 5$

Q17. $3x + 4y – 5 = 0$
$x – y + 3 = 0$

Q18. $3x – 2y + 3z = 8$
$2x + y – z = 1$
$4x – 3y + 2z = 4$

Q19. $x – y + z = -1$
$2x + y – z = 2$
$x – 2y-z = 4$

Q20. $x + y + z = 4$
$2x – y + z = -1$
$2x + y – 3 = -9$

Q21. $4x + 2y + 3z = 5$
$x - 2y + z = -4$
$3x - y – 2z = 3$

Q22. $4x + 2y + 3z =9$
$X + y + z = 1$
$3x + y – 2z = 1$

Q23. $3x – 4y + 2z = -1$
$2x + 3y + 5z = 7$
$x + z = 2$

Q24. $6x – 9y – 20z = -4$
$4x – 15y + 10z = -1$
$2x – 3y – 5z = -1$

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

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

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

Q28. If $A = \begin{vmatrix} 2 & -3 & 5 \\ 3 & 2 & -4 \\ 1 & 1 & -2 \end{vmatrix}$ find $A^{-1}$

Using $A^{-1}$ solve the foll. System of equations
$2x - 3y + 5z = 11$
$3x + 2y - 4z = -5$
$x + y - 2z = -3$