

SARALA BIRLA PUBLIC SCHOOL

Birla Knowledge City, Mahilong, Ranchi
CLASS-XII (2020-21)



SARALA BIRLA
PUBLIC SCHOOL

(SARALA BIRLA GROUP OF SCHOOLS)

Sub: Mathematics Assignment-3

Using properties of determinants, prove the following :

$$1. \begin{vmatrix} a+b+2c & a & b \\ c & b+c+2a & b \\ c & a & c+a+2b \end{vmatrix} = 2(a+b+c)^3$$

$$2. \begin{vmatrix} \alpha & \beta & \gamma \\ \alpha^2 & \beta^2 & \gamma^2 \\ \beta+\gamma & \gamma+\alpha & \alpha+\beta \end{vmatrix} = (\alpha-\beta)(\beta-\gamma)(\gamma-\alpha)(\alpha+\beta+\gamma)$$

$$3. \begin{vmatrix} x & x^2 & 1+x^3 \\ y & y^2 & 1+y^3 \\ z & z^2 & 1+z^3 \end{vmatrix} = (1+xyz) \begin{vmatrix} 1 & x & x^2 \\ 1 & y & y^2 \\ 1 & z & z^2 \end{vmatrix}$$

$$4. \begin{vmatrix} b+c & q+r & y+z \\ c+a & r+p & z+x \\ a+b & p+q & x+y \end{vmatrix} = 2 \begin{vmatrix} a & p & x \\ b & q & y \\ c & r & z \end{vmatrix}$$

$$5. \text{ Show that } \triangle ABC \text{ is isosceles if } \begin{vmatrix} 1 & 1 & 1 \\ 1+\cos A & 1+\cos B & 1+\cos C \\ \cos^2 A + \cos A & \cos^2 B + \cos B & \cos^2 C + \cos C \end{vmatrix} = 0$$

Properties of Adjoint and Inverse of Matrix

6. If A is an invertible matrix of order 3 and $|A| = 5$ then find the value of $|adjA|$.

7. A square matrix A of order 3, has $|A| = 5$ find $|A \cdot adjA|$.

8. If $A = \begin{bmatrix} 2 & -1 \\ -1 & 2 \end{bmatrix}$ and I is the identity matrix of order 2, then show that $A^2 = 4A - 3I$. Hence find A^{-1}

9. If $A = \begin{bmatrix} 3 & -2 \\ 4 & -2 \end{bmatrix}$, find the value of λ so that $A^2 = \lambda A - 2I$. Hence find A^{-1}

Find the inverse of the following matrix by using elementary row or column transformation.

10. $\begin{bmatrix} 1 & -1 \\ 2 & 3 \end{bmatrix}$

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

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

Solve linear equation by matrix method.

13. $x + 2y + z = 7$; $x + 3z = 11$; $2x - 3y = 1$

14. $x + y + z = 1$; $x - 2y + 3z = 2$; $x - 3y + 5z = 3$