Tutorial : 1 [chapter 4]

1) Evaluate the determinant

(i) $\Delta = \begin{vmatrix} 1 & 2 & 4 \\ -1 & 3 & 0 \\ 4 & 1 & 0 \end{vmatrix}$

(ii) $\Delta = \begin{vmatrix} 0 & \sin\alpha & -\cos\alpha \\ -\sin\alpha & 0 & \sin\beta \\ \cos\alpha & -\sin\beta & 0 \end{vmatrix}$

2) If $A = \begin{bmatrix} 1 & 0 & 1 \\ 0 & 1 & 2 \\ 0 & 0 & 4 \end{bmatrix}$ then,

show that $|3A| = 27|A|$.

3) Find value of x if,

$\begin{vmatrix} 2 & 4 \\ 3 & 1 \end{vmatrix} = \begin{vmatrix} 2x & 4 \\ 6 & x \end{vmatrix}$.

4) Prove that $\begin{vmatrix} a & a+b & a+b+c \\ 2a & 3a+2b & 4a+3b+2c \\ 3a & 6a+3b & 10a+6b+3c \end{vmatrix} = a^3$

5) If x, y, z are different and

$\Delta = \begin{vmatrix} x & x^2 & 1+x^3 \\ y & y^2 & 1+y^3 \\ z & z^2 & 1+z^3 \end{vmatrix} = 0$ then

show that $1+xyz=0$.

6) Show that

$\begin{vmatrix} 1+a & 1 & 1 \\ 1 & 1+b & 1 \\ 1 & 1 & 1+c \end{vmatrix} = abc\left(1+\frac{1}{a}+\frac{1}{b}+\frac{1}{c}\right)$

$= abc+bc+ac+ab$

7) using the property of determinants & without expansion prove the following

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

(ii) $\begin{vmatrix} 1+a^2-b^2 & 2ab & -2b \\ 2ab & 1-a^2+b^2 & 2a \\ 2b & -2a & 1-a^2-b^2 \end{vmatrix}$

$= (1+a^2+b^2)^3$

8) Find the area of the triangle whose vertices are $(2,7), (1,1), (10,8)$.

9) Find minors and cofactors of the elements $\begin{vmatrix} 2 & -3 & 5 \\ 6 & 0 & 4 \\ 1 & 5 & -7 \end{vmatrix}$

and verify

$a_{11}A_{31} + a_{12}A_{32} + a_{13}A_{33} = 0$.

10) Find A^{-1} for $\begin{bmatrix} 2 & 1 & 3 \\ 4 & -1 & 0 \\ -7 & 2 & 1 \end{bmatrix}$

11) For $A = \begin{bmatrix} 3 & 2 \\ 1 & 1 \end{bmatrix}$ find a and b such that $A^2+aA+bI=0$.

12) solve the equations using matrix method.

$2x+y+z=1$

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

$3y-5z=9$.

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