

## Determinants Assignment

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**QUESTION 1:** Using properties of determinants, evaluate the given determinant

$$\begin{vmatrix} a+b+2c & a & b \\ c & b+c+2a & b \\ c & a & c+a+2b \end{vmatrix}$$

**QUESTION 2:** Show that the value of the given determinant is 0

$$\Delta = \begin{vmatrix} 1 & a & b+c \\ 1 & b & c+a \\ 1 & c & a+b \end{vmatrix}$$

**QUESTION 3:**

If  $x, y, z$  are different and  $\begin{vmatrix} x & x^2 & 1+x^3 \\ y & y^2 & 1+y^3 \\ z & z^2 & 1+z^3 \end{vmatrix} = 0$ ; show that  $xyz = -1$

**QUESTION 4:**

Evaluate the determinant :  $\begin{vmatrix} x & \sin \theta & \cos \theta \\ -\sin \theta & -x & 1 \\ \cos \theta & 1 & x \end{vmatrix}$

**QUESTION 5:** If the value of the given determinant is 1, what may be the value of  $x$

$$\begin{vmatrix} x & x+1 \\ x-1 & x \end{vmatrix}$$

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**QUESTION 6:** Expand the determinant of square matrix  $A = [a_{ij}]_{3 \times 3}$ , along the second row and the first column and show that you get the same value .

$$|A| = \begin{vmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{vmatrix}$$

**QUESTION 7:** Find the equation of the line joining A(1, 3) and B (0, 0) using determinants.

**QUESTION 8:** Is the given matrix A , a singular matrix?

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

**QUESTION 9:** Solve the given system of equations :

$$\begin{aligned} x + y + z &= 6 \\ y + 3z &= 11 \\ x - 2y + z &= 0 \end{aligned}$$

**QUESTION 10:**

Find a relation between the values of the two given Determinants:

$$\begin{vmatrix} a+bx & c+dx & p+qx \\ ax+b & cx+d & px+q \\ u & v & w \end{vmatrix}$$

$$\begin{vmatrix} a & c & p \\ b & d & q \\ u & v & w \end{vmatrix}$$

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### QUESTION 11:

Find the interval in which the value of Determinant A lies , if the interval in which  $\theta$  lies is  $[0, 2\pi]$

### QUESTION 12:

Let  $a, b, c$  be positive numbers , but not all equal.

Show that the value of the determinant  $\begin{vmatrix} a & b & c \\ b & c & a \\ c & a & b \end{vmatrix}$  is negative

### QUESTION 13:

Find the roots .:

$$\begin{vmatrix} x & -6 & -1 \\ 2 & -3x & x-3 \\ -3 & 2x & x+2 \end{vmatrix} = 0$$

### QUESTION 14:

Using only the properties of Determinants , determine the value of the given Determinant A.

$$\Delta = \begin{vmatrix} 1 & a & b+c \\ 1 & b & c+a \\ 1 & c & a+b \end{vmatrix}$$

**QUESTION 15:** Prove without expanding the determinant , that

$$\left[ 1 + \frac{1}{a} + \frac{1}{b} + \frac{1}{c} \right] \text{ is a factor of the determinant } \begin{vmatrix} 1+a & 1 & 1 \\ 1 & 1+b & 1 \\ 1 & 1 & 1+c \end{vmatrix}$$