# DETERMINANTS

## INTRODUCTION AND DETERMINANTS

## EXERCISE

**Q.1** The value of the determinant $\begin{vmatrix} a+b+2c & a & b \\ c & b+c+2a & b \\ c & a & c+a+2b \end{vmatrix}$ is -

(A) $2(a+b+c)$ (B) $2(a+b+c)^2$

(C) $2(a+b+c)^3$ (D) $(2a+2b+2c)^3$

**Q.2** $\begin{vmatrix} a & b & a\alpha+b \\ b & c & b\alpha+c \\ a\alpha+b & b\alpha+c & 0 \end{vmatrix} = 0$, then a, b, c are in -

(A) A.P. (B) G.P.

(C) H.P. (D) None of these

**Q.3** $\begin{vmatrix} b^2+c^2 & a^2 & a^2 \\ b^2 & c^2+a^2 & b^2 \\ c^2 & c^2 & a^2+b^2 \end{vmatrix}$ is equal to -

(A) $a^2b^2c^2$ (B) $2a^2b^2c^2$

(C) $4a^2b^2c^2$ (D) None of these

**Q.4** If $\begin{vmatrix} a & 5x & p \\ b & 10y & 5 \\ c & 15z & 15 \end{vmatrix} = 125$, then $\begin{vmatrix} 3a & 3b & c \\ x & 2y & z \\ p & 5 & 5 \end{vmatrix}$ is equal to -

(A) 25 (B) 50

(C) 75 (D) 100

**Q.5** $\Delta = \begin{vmatrix} \lambda & c & -b \\ -c & \lambda & a \\ b & -a & \lambda \end{vmatrix}$, then the value of $\Delta' = \begin{vmatrix} a^2+\lambda^2 & ab+c\lambda & ca-b\lambda \\ ab-c\lambda & b^2+\lambda^2 & bc+a\lambda \\ ac+b\lambda & bc-a\lambda & c^2+\lambda^2 \end{vmatrix}$ is -

(A) $3\Delta$ (B) $\Delta^2$

(C) $\Delta^3$ (D) None of these

**Q.6** If $\begin{vmatrix} 3^2+k & 4^2 & 3^2+3+k \\ 4^2+k & 5^2 & 4^2+4+k \\ 5^2+k & 6^2 & 5^2+5+k \end{vmatrix} = 0$, then the value of k is –

(A) 2 (B) 1

(C) –1 (D) 0

**Q.7** The determinant $\begin{vmatrix} 0 & (a-b)^2 & (a-c)^2 \\ (b-a)^2 & 0 & (b-c)^2 \\ (c-a)^2 & (c-b)^2 & 0 \end{vmatrix}$ is equal to -

(A) $(a-b)^2 (b-c)^2 (c-a)^2$ (B) 0

(C) $2(a-b)^2 (b-c)^2 (c-a)^2$ (D) None of these

**Q.8** If $0 < \theta < \pi/2$ and $\begin{vmatrix} 1+\sin^2\theta & \cos^2\theta & 4\sin 4\theta \\ \sin^2\theta & 1+\cos^2\theta & 4\sin 4\theta \\ \sin^2\theta & \cos^2\theta & 1+4\sin 4\theta \end{vmatrix} = 0$ then $\theta$ is equal to

(A) $\pi/24, 5\pi/24$ (B) $5\pi/24, 7\pi/24$

(C) $7\pi/24, 11\pi/24$ (D) None of these

**Q.9** $\begin{vmatrix} {}^xC_1 & {}^xC_2 & {}^xC_3 \\ {}^yC_1 & {}^yC_2 & {}^yC_3 \\ {}^zC_1 & {}^zC_2 & {}^zC_3 \end{vmatrix}$ is equal to -

(A) $xyz\,(x-y)(y-z)(z-x)$ (B) $\frac{xyz}{6}(x-y)(y-z)(z-x)$

(C) $\frac{xyz}{12}(x-y)(y-z)(z-x)$ (D) None of these

**Q.10** If $\Delta_1 = \begin{vmatrix} x & b & b \\ a & x & b \\ a & a & x \end{vmatrix}$ and $\Delta_2 = \begin{vmatrix} x & b \\ a & x \end{vmatrix}$ then

(A) $\Delta_1 = 3\Delta_2{}^2$

(B) $\frac{d}{dx}(\Delta_1) = 3\Delta_2{}^2$

(C) $\frac{d}{dx}(\Delta_1) = 3\Delta_2$

(D) None of these

## ANSWER KEY

**1.** (C) $2(a + b + c)^3$

**2.** (B) G.P.

**3.** (C) $4a^2b^2c^2$

**4.** (A) 25

**5.** (B) $\Delta^2$

**6.** (B) 1

**7.** (C) $2(a - b)^2 (b - c)^2 (c - a)^2$

**8.** (C) $7\pi/24, 11\pi/24$

**9.** (C) $\frac{xyz}{12}(x - y)(y - z)(z - x)$

**10.** (C) $\frac{d}{dx}(\Delta_1) = 3\Delta_2$