



MATHS

BOOKS - CENGAGE MATHS (HINGLISH)

DETERMINANTS

Examples

1. find the value of $\begin{vmatrix} 1 & 2 & 4 \\ -1 & 3 & 0 \\ 4 & 1 & 0 \end{vmatrix}$



Watch Video Solution

2. Prove that the determinant $\Delta = \begin{vmatrix} x & \sin\theta & \cos\theta \\ -\sin\theta & -x & 1 \\ \cos\theta & 1 & x \end{vmatrix}$ is independent of θ .

 [Watch Video Solution](#)

3. The parameter on which the value of the determinant $\begin{vmatrix} 1 & a^2 \cos(p-d)x & \cos px & \cos(p+d)x \\ \sin(p-d)x & \sin px & \sin(p+d)x & x \end{vmatrix}$ does not depend is a, b, p, c, d, x

 [Watch Video Solution](#)

4. Let a, b, c be positive and 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

 [Watch Video Solution](#)

5. If $a, b, c \in R$, then find the number of real roots of the equation

$$= |xc - b - cxab - ax| = 0$$

 [Watch Video Solution](#)

6. If $x + y + z = 0$, prove that
$$\begin{vmatrix} ax & by & cz \\ cy & az & bx \\ bz & cx & ay \end{vmatrix} = xyz \begin{vmatrix} a & b & c \\ c & a & b \\ b & c & a \end{vmatrix}$$

 [Watch Video Solution](#)

7. If $p\lambda^4 + q\lambda^3 + r\lambda^2 + s\lambda + t = \begin{vmatrix} \lambda^2 + 3\lambda & \lambda - 1 & \lambda + 3 \\ \lambda^2 + 1 & 2 - \lambda & \lambda - 3 \\ \lambda^2 - 3 & \lambda + 4 & 3\lambda \end{vmatrix}$ then $t =$

 [Watch Video Solution](#)

8. The largest value of a third order determinant whose elements are equal to 1 or 0 is

 [Watch Video Solution](#)

9. Prove that the value of the determinant

$$\begin{vmatrix} -7 & 5 + 3i & \frac{2}{3} - 4i \\ 5 - 3i & 8 & 4 + 5i \\ \frac{2}{3} + 4i & 4 - 5i & 9 \end{vmatrix} \text{ is real}$$

 [Watch Video Solution](#)

10. Without expanding the determinants Prove that

$$\begin{vmatrix} 103 & 115 & 114 \\ 111 & 108 & 106 \\ 104 & 113 & 116 \end{vmatrix} + \begin{vmatrix} 113 & 116 & 104 \\ 108 & 106 & 111 \\ 115 & 114 & 103 \end{vmatrix} = 0$$

 [Watch Video Solution](#)

11. Prove that

$$\begin{vmatrix} ax & by & cz \\ x^2 & y^2 & z^2 \\ 1 & 1 & 1 \end{vmatrix} = \begin{vmatrix} a & c & c \\ x & y & z \\ yz & xz & xy \end{vmatrix}$$

 [Watch Video Solution](#)

12. for $x, y, z > 0$ Prove that

$$\begin{vmatrix} 1 & \log_x y & \log_x z \\ \log_y x & 1 & \log_y z \\ \log_z x & \log_z y & 1 \end{vmatrix} = 0$$



Watch Video Solution

13. without expanding at any stage Prove that

$$\begin{vmatrix} 0 & a & -b \\ -a & 0 & -c \\ b & c & 0 \end{vmatrix} = 0$$



Watch Video Solution

14. consider the fourth -degree polynomial equation

$$\begin{vmatrix} a_1 + b_1x & a_1x^2 + b_1 & c_1 \\ a_2 + b_2x^2 & a_2x^2 + b_2 & c_2 \\ a_3 + b_3x^2 & a_3x^2 + b_3 & c_3 \end{vmatrix} = 0$$

Without expanding the determinant find all the roots of the equation.

 [Watch Video Solution](#)

15. Let $\Delta_r = \begin{vmatrix} r-1 & n & 6 \\ (r-1)^2 & 2n^2 & 4n-2 \\ (r-1)^2 & 3n^3 & 3n^2-3n \end{vmatrix}$. Show that $\sum_{r=1}^n \Delta_r$

is constant.

 [Watch Video Solution](#)

16. Find the value of $\begin{vmatrix} 41 & 1 & 5 \\ 79 & 7 & 9 \\ 29 & 5 & 3 \end{vmatrix}$

 [Watch Video Solution](#)

17. Find the value of determinant

$$\begin{vmatrix} \sqrt{13} + \sqrt{3} & 2\sqrt{5} & \sqrt{5} \\ \sqrt{15} + \sqrt{26} & 5 & \sqrt{10} \\ 3 + \sqrt{65} & \sqrt{15} & 5 \end{vmatrix}$$

 [Watch Video Solution](#)

18. Find the value of the determinant

$$\begin{vmatrix} 1 & 1 & 1 & 1 \\ 1 & 2 & 3 & 4 \\ 1 & 3 & 6 & 10 \\ 1 & 4 & 10 & 20 \end{vmatrix}$$

 [Watch Video Solution](#)

19. Prove that $\begin{vmatrix} \sin\alpha & \cos\alpha & \sin(\alpha + \delta) \\ \sin\beta & \cos\beta & \sin(\beta + \delta) \\ \sin\gamma & \cos\gamma & \sin(\gamma + \delta) \end{vmatrix} = 0$

 [Watch Video Solution](#)

20. Using properties of determinants, solve the following for x :

$$|x - 22x - 33x - 4x - 42x - 93x - 16x - 82x - 273x - 64| = 0$$

 [Watch Video Solution](#)

21. By using properties of determinants, prove the following:

$$|x + 42x2x2 \times + 42x2x2 \times + 4| = (5x + 4)(4 - x)^2$$

 [Watch Video Solution](#)

22. prove that

$$\begin{bmatrix} a - b - c & 2a & 2a \\ 2b & b - c - a & 2b \\ 2c & 2c & c - a - b \end{bmatrix} = (a + b + c)^3$$

 [Watch Video Solution](#)

23. if $x_i = a_i b_i c_i, i = 1, 2, 3$ are three- digit positive integer such that

each x_i is a multiple of 19 then prove that $\det \begin{Bmatrix} a_1 & a_2 & a_3 \\ b_1 & b_2 & b_3 \\ c_1 & c_2 & c_3 \end{Bmatrix}$ is

divisible by 19.

 [Watch Video Solution](#)

24. If a, b and c are real numbers, and $\Delta = |b + a + bc + aa + ca + a| = 0$. Show that either $a + b + c = 0$ or $a = b = c$.

 [Watch Video Solution](#)

25. Find the value of the determinant $|baabpqr111|$, where a, b , and c are respectively, the p th, q th, and r th terms of a harmonic progression.

 [Watch Video Solution](#)

26.

if a_1, a_2, a_3, \dots are in A.P, then find the value of the following determinant:

$$\begin{vmatrix} a_p + a_{p+m} + a_{p+2m} & 2a_p + 3a_{p+m} + 4a_{p+2m} & 4a_p + 9a_{p+m} + 16a_{p+2m} \\ a_q + a_{q+m} + a_{q+2m} & 2a_q + 3a_{q+m} + 4a_{q+2m} & 4a_q + 9a_{q+m} + 16a_{q+2m} \\ a_r + a_{r+m} + a_{r+2m} & 2a_r + 3a_{r+m} + 4a_{r+2m} & 4a_r + 9a_{r+m} + 16a_{r+2m} \end{vmatrix}$$



[Watch Video Solution](#)

27.

Prove

that

$$\left| \begin{pmatrix} 1, \beta\gamma + \alpha\delta, \beta^2\gamma^2 + \alpha^2\delta^2 \end{pmatrix}, \begin{pmatrix} 1, \gamma\alpha + \beta\delta, \gamma^2\alpha^2 + \beta^2\delta^2 \end{pmatrix}, \begin{pmatrix} 1, \alpha\beta + \gamma\delta, \alpha^2\beta^2 + \gamma^2\delta^2 \end{pmatrix} \right|$$



[View Text Solution](#)

28.

Prove

that

$$\left| ab + ca^2bc + ab^2ca + bc^2 \right| = -(a + b + c) \times (a - b)(b - c)(c - a)$$



[Watch Video Solution](#)

29. Prove that
$$\begin{vmatrix} x^2 & x^2 - (y - z)^2 & yz \\ y^2 & y^2 - (z - x)^2 & zx \\ z^2 & z^2 - (x - y)^2 & xy \end{vmatrix}$$

$$= (x - y)(y - z)(z - x)(x + y + z)(x^2 + y^2 + z^2)$$

 [Watch Video Solution](#)

30. If a, b, c are all distinct and
$$\begin{vmatrix} a & a^3 & a^4 - 1 \\ b & b^3 & b^4 - 1 \\ c & c^3 & c^4 - 1 \end{vmatrix} = 0,$$
 show that

$$abc(ab+bc+ac) = a+b+c$$

 [Watch Video Solution](#)

31. Prove that
$$\begin{vmatrix} a^2 + 1 & ab & ac \\ ab & b^2 + 1 & bc \\ ac & bc & c^2 + 1 \end{vmatrix} = 1 + a^2 + b^2 + c^2$$

 [Watch Video Solution](#)

32. prove that
$$\begin{vmatrix} (b+c)^2 & bc & ac \\ ba & (c+a)^2 & cb \\ ca & cb & (a+b)^2 \end{vmatrix}$$

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

 [Watch Video Solution](#)

33. Let a, b, c be real numbers with $a^2 + b^2 + c^2 = 1$. Show that the

equation
$$\begin{vmatrix} ax - by - c & bx + ay & cx + a \\ bx + ay & -ax + by - c & cy + b \\ cx + a & cy + b & -ax - by + c \end{vmatrix} = 0$$
 represents a straight

line.

 [Watch Video Solution](#)

34. If $a^2 + b^2 + c^2 = 1$, then prove that

$$\left| a^2 + (b^2 + c^2) \cos \phi \right| ab(1 - \cos \phi) ac(1 - \cos \phi) ba(1 - \cos \phi) b^2 + \left(c^2 + a^2 \right) \cos \phi bc(1 - \cos \phi)$$

is independent of a, b, c .



[Watch Video Solution](#)

35. Find the area of a triangle whose vertices are

$$A(3, 2), B(11, 8) \text{ and } C(8, 12)$$



[Watch Video Solution](#)

36. If the lines $a_1x + b_1y + 1 = 0$, $a_2x + b_2y + 1 = 0$ and $a_3x + b_3y + 1 = 0$

are concurrent, show that the points (a_1, b_1) , (a_2, b_2) and (a_3, b_3) are

collinear.



[Watch Video Solution](#)

37. The number of values of a for which the lines $2x + y - 1 = 0$, $ax + 3y - 3 = 0$, and $3x + 2y - 2 = 0$ are concurrent is 0 (b) 1 (c) 2 (d) infinite



Watch Video Solution

38. If the lines $ax + y + 1 = 0$, $x + by + 1 = 0$ and $x + y + c = 0$ (a, b, c being distinct and different from 1) are concurrent, then prove that

$$\frac{1}{1-a} + \frac{1}{1-b} + \frac{1}{1-c} = 1.$$



Watch Video Solution

39. Find the value of λ if $2x^2 + 6xy + 3y^2 + 8x + 14y + \lambda = 0$ represent a pair of straight lines.



Watch Video Solution

40. show that the determinant

$$\begin{vmatrix} a^2 + b^2 + c^2 & bc + ca + ab & bc + ca + ab \\ bc + ca + ab & a^2 + b^2 + c^2 & bc + ca + ab \\ bc + ca + ab & bc + ca + ab & a^2 + b^2 + c^2 \end{vmatrix}$$

is always non-negative.



[Watch Video Solution](#)

41. Factorize the following

$$3a^3 + b^3 + c^3 + 3abc + a^2b + ab^2 + a^2c + ac^2 + b^2c + bc^2 + a^3 + b^3 + c^3$$



[Watch Video Solution](#)

42. prove that
$$\begin{vmatrix} (a-x)^2 & (a-y)^2 & (a-z)^2 \\ (b-x)^2 & (b-y)^2 & (b-z)^2 \\ (c-x)^2 & (c-y)^2 & (c-z)^2 \end{vmatrix}$$

$$\begin{vmatrix} (1+ax)^2 & (1+bx)^2 & (1+cx)^2 \\ (1+ay)^2 & (1+by)^2 & (1+cy)^2 \\ (1+az)^2 & (1+bx)^2 & (1+cz)^2 \end{vmatrix}$$

$$= 2(b-c)(c-a)(a-b) \times (y-z)(z-x)(x-y)$$



Watch Video Solution

43. If α, β, γ are real numbers, then without expanding at any stage, show that $|\cos(\beta - \alpha)\cos(\gamma - \alpha)\cos(\alpha - \beta)\cos(\gamma - \beta)\cos(\alpha - \gamma)\cos(\beta - \gamma)| = 0$



Watch Video Solution

44. If
$$\begin{vmatrix} 1 & x & x^2 \\ x & x^2 & 1 \\ x^2 & 1 & x \end{vmatrix} = 3$$
 then find the value of
$$\begin{vmatrix} x^3 - 1 & 0 & x - x^4 \\ 0 & x - x^4 & x^3 - 1 \\ x - x^4 & x^3 - 1 & 0 \end{vmatrix}$$



Watch Video Solution

45. Show that
$$\begin{vmatrix} bc - a^2 & ca - b^2 & ab - c^2 \\ ca - b^2 & ab - c^2 & bc - a^2 \\ ab - c^2 & bc - a^2 & ca - b^2 \end{vmatrix}$$

$$\begin{vmatrix} a^2 & c^2 & 2ca - b^2 \\ 2ab - c^2 & b^2 & a^2 \\ b^2 & 2ac - a^2 & c^2 \end{vmatrix}.$$



Watch Video Solution

46. Let
$$f(x) = \begin{vmatrix} \cos x & \sin x & \cos x \\ \cos 2x & \sin 2x & 2\cos 2x \\ \cos 3x & \sin 3x & 3\cos 3x \end{vmatrix}$$
 then find the values of $f(0)$ and f'
 $(\pi/2)$.



Watch Video Solution

47. if
$$= \begin{vmatrix} x^n & n! & 2 \\ \cos x & \cos \frac{n\pi}{2} & 4 \\ \sin x & \sin \frac{n\pi}{2} & 8 \end{vmatrix},$$
 then find the value of

$$\frac{d^n}{dx^n}[f(x)]_{x=0} (n \in \mathbb{Z})$$

 [Watch Video Solution](#)

48. if $f, g,$ and h are differentiable function of x and

$$\Delta(x) = \begin{vmatrix} f & g & h \\ (xf)' & (xg)' & (xh)' \\ (x^2f)'' & (x^2g)'' & (x^2h)'' \end{vmatrix} \quad \text{prove that}$$

$$\Delta(x) = \begin{vmatrix} f & g & h \\ f' & g' & h' \\ (x^3f'')' & (x^3g'')' & (x^3h'')' \end{vmatrix} \quad \text{where prime(') denotes the derivatives .}$$

 [View Text Solution](#)

49. Let α be a repeated root of a quadratic equation $f(x) = 0$ and $A(x), B(x), C(x)$ be polynomials of degrees 3, 4, and 5, respectively, then show that $|A(x)B(x)C(x)A(\alpha)B(\alpha)C(\alpha)A'(\alpha)B'(\alpha)C'(\alpha)|$ is divisible by $f(x)$, where prime (') denotes the derivatives.

 [Watch Video Solution](#)

50. if $\Delta(x) = \begin{vmatrix} a_1 + x & b_1 + x & c_1 + x \\ a_2 + x & b_2 + x & c_2 + x \\ a_3 + x & b_3 + x & c_3 + x \end{vmatrix}$ then show that $\Delta(x) = 0$

and that $\Delta(x) = \Delta(0) + sx$. where s denotes the sum of all the cofactors of all the elements in $\Delta(0)$

 [View Text Solution](#)

51. If $\Delta(x) = \begin{vmatrix} 1 & x^2 & x^2 & 6 & 4x & 39 & x & -7 \end{vmatrix}$ then find the value of $\int_0^1 \Delta(x) dx$

without expanding $\Delta(x)$.



[Watch Video Solution](#)

52. Find the value of a and b if the system of equations $a^2x - by = a^2 - b$ and $bx = b^2y = 2 + 4b$ (i) possesses a unique solution (ii) infinite solutions



[Watch Video Solution](#)

53. If a system of three linear equations

$$x + 4ay + a = 0, \quad x + 3by + b = 0, \quad \text{and} \quad x + 2cy + c = 0$$

is consistent, then prove that a, b, c are in H.P.



[Watch Video Solution](#)

54. Solve by Cramer's rule $x + y + z = 6$, $x - y + z = 2$, $3x + 2y - 4z = -5$



[Watch Video Solution](#)

55. For what values of p and q the system of equations $2x + py + 6z = 8$, $x + 2y + qz = 5$, $x + y + 3z = 4$ has i no solution ii a unique solution iii in finitely many solutions.



[Watch Video Solution](#)

56. If $2ax - 2y + 3z = 0$, $x + ay + 2z = 0$, and $2 + az = 0$ have a nontrivial solution, find the value of a .



[Watch Video Solution](#)

57. For what values of k , the following system of equations possesses a nontrivial solution over the set of rationals:
 $c + ky + 3z = 0$, $3c + ky - 2z = 0$, $2c + 3y - 4x = 0$. Also find the solution for this value of k .



[Watch Video Solution](#)

58.

Prove

that:

$$|-2aa + ba + cb + a - 2 + + ac + b - 2c| = 4(a + b)(b + c)(c + a)$$


[Watch Video Solution](#)

59. If a, b and c are non-zero real number then prove that

$$\begin{vmatrix} b^2c^2 & bc & b+c \\ c^2a^2 & ca & c+a \\ a^2b^2 & ab & a+b \end{vmatrix} = 0$$


[Watch Video Solution](#)

60.

Prove

that

$$|ax - by - czay + bxcx + azay + bxby - cz - axbz + cycx + azbz + cycz - ax - by| = (x - y - z)^2$$


[Watch Video Solution](#)

61. If $f(x)$ is a polynomial of degree < 3 , prove that

$$\left| \frac{1af(a)}{(x-a)} - \frac{1bf(b)}{(x-b)} - \frac{1cf(c)}{(x-c)} \right| \div \left| 1aa^2 - 1^2a^2 - 2 \right| = \frac{f(x)}{(x-a)(x-b)(x-c)}$$

 [Watch Video Solution](#)

$$62. \begin{vmatrix} 2a_1b_1 & a_1b_2 + a_2b_1 & a_1b_3 + a_3b_1 \\ a_1b_2 + a_2b_1 & 2a_2b_2 & a_2b_3 + a_3b_2 \\ a_1b_3 + a_3b_1 & a_3b_2 + a_2b_3 & 2a_3b_3 \end{vmatrix} =$$

 [Watch Video Solution](#)

63. Find the value of

$$\begin{vmatrix} \cos\left(\frac{2\pi}{63}\right) & \cos\left(\frac{3\pi}{70}\right) & \cos\left(\frac{4\pi}{77}\right) \\ \cos\left(\frac{\pi}{72}\right) & \cos\left(\frac{\pi}{40}\right) & \cos\left(\frac{3\pi}{88}\right) \\ 1 & \cos\left(\frac{\pi}{90}\right) & \cos\left(\frac{2\pi}{99}\right) \end{vmatrix}$$

 [View Text Solution](#)

64. Let $f(t) = \begin{vmatrix} \cos t & t & 1 \\ 2\sin t & t & 2t \\ \sin t & t & t \end{vmatrix}$. Then find $\lim_{t \rightarrow 0} \frac{f(t)}{t^2}$

 **Watch Video Solution**

65. it

$$x_1^2 + 2y_1^2 + 3z_1^2 = x_2^2 + 2y_2^2 + 3z_2^2 = x_3^2 + 2y_3^2 + 3z_3^2 = 2 \text{ and } x_2x_3 + 2y_2y_3 + 3z_2z_3 =$$

Then find the value of $\begin{vmatrix} x_1 & y_1 & z_1 \\ x_2 & y_2 & z_2 \\ x_3 & y_3 & z_3 \end{vmatrix}$

 **Watch Video Solution**

66. Let α_1, α_2 and β_1, β_2 be the roots of the equation $ax^2 + bx + c = 0$ and $px^2 + qx + r = 0$ respectively. If the system of equations $\alpha_1y + \alpha_2z = 0$ and

$\beta_1y + \beta_2z = 0$ has a non trivial solution then prove that $\frac{b^2}{q^2} = \frac{ac}{pr}$

 **Watch Video Solution**

67. If $bc + qr = ca + rp = ab + pq = -1$ and $(abc, pqr \neq 0)$ then $\begin{vmatrix} ap & a & p \\ bq & b & q \\ cr & c & r \end{vmatrix}$

is (A) 1 (B) 2 (C) 0 (D) 3

 [Watch Video Solution](#)

Exercise 12 1

1. Evaluate $|\cos\alpha\cos\beta\cos\alpha\sin\beta - \sin\alpha - \sin\beta\cos\beta\sin\alpha\cos\beta\sin\alpha\sin\beta\cos\alpha|$

 [Watch Video Solution](#)

2. If A,B,C are the angles of a non right angled triangle ABC. Then find the

value of: $\begin{vmatrix} \tan A & 1 & 1 \\ 1 & \tan B & 1 \\ 1 & 1 & \tan C \end{vmatrix}$

 [Watch Video Solution](#)

3. If $e^{i\theta} = \cos\theta + i\sin\theta$, find the value of

$$\left| 1e^{i\pi/3}e^{i\pi/4}e^{-i\pi/3}1e^{i2\pi/3}e^{-i\pi/4}e^{-i2\pi/3}1 \right|$$

 [Watch Video Solution](#)

4. Find the number of real root of the equation

$$|0x - ax - bx + a0x - cx + bx + c0| = 0, a \neq b \neq c \text{ and } b(a + c) > ac$$

 [Watch Video Solution](#)

5. If α, β, γ are the roots of

$$ax^3 + bx^2 + cx + d = 0 \text{ and } |\alpha\beta\gamma\beta\gamma\alpha\gamma\alpha\beta| = 0, \alpha \neq \beta \neq \gamma \text{ then find the equation}$$

whose roots are $\alpha + \beta - \gamma, \beta + \gamma - \alpha$, and $\gamma + \alpha - \beta$.

 [Watch Video Solution](#)

6. A triangle has vertices $A_i(x_i, y_i)$ for $i = 1, 2, 3$. If the orthocenter of triangle is $(0, 0)$ then prove that

$$\begin{vmatrix} x_2 - x_3 & y_2 - y_3 & y_1(y_2 - y_3) + x_1(x_2 - x_3) \\ x_3 - x_1 & y_3 - y_1 & y_2(y_3 - y_1) + x_2(x_3 - x_1) \\ x_1 - x_2 & y_1 - y_2 & y_3(y_1 - y_2) + x_3(x_1 - x_2) \end{vmatrix} = 0$$



Watch Video Solution

7. if $\omega \neq 1$ is cube root of unity and $x+y+z \neq 0$ then

$$\begin{vmatrix} \frac{x}{1+\omega} & \frac{y}{\omega+\omega^2} & \frac{z}{\omega^2+1} \\ \frac{y}{\omega+\omega^2} & \frac{z}{\omega^2+1} & \frac{x}{1+\omega} \\ \frac{z}{\omega^2+1} & \frac{x}{1+\omega} & \frac{y}{\omega+\omega^2} \end{vmatrix} = 0 \text{ if}$$



Watch Video Solution

1. Prove that the value of determinant $\begin{vmatrix} 1 & \omega & \omega^2 \\ \omega & \omega^2 & 1 \\ \omega^2 & 1 & \omega \end{vmatrix} = 0$

where ω is complex cube root of unity .

 [Watch Video Solution](#)

2. Prove that $\begin{vmatrix} a & a^2 & bc \\ b & b^2 & ac \\ c & c^2 & ab \end{vmatrix} \begin{vmatrix} 1 & 1 & 1 \\ a^2 & b^2 & c^2 \\ a^3 & b^3 & c^3 \end{vmatrix}$

 [Watch Video Solution](#)

3. if $\Delta = \begin{vmatrix} abc & a_2 & c^2b \\ abc & c^2a & ca^2 \\ abc & a^2b & b^2a \end{vmatrix} = 0$, ($a, b, c \in R$ and are all

different and non-zero) the prove that $a + b + c = 0$

[Watch Video Solution](#)

4. if $a_r = (\cos 2r\pi + i \sin 2r\pi)^{1/9}$ then prove that

$$\begin{vmatrix} a_1 & a_2 & a_3 \\ a^4 & a^5 & a_6 \\ a_7 & a_8 & a_9 \end{vmatrix} = 0$$

[Watch Video Solution](#)

5. Given $A = |ab2cde2flm2n|$, $B = |f2de2n4l2mc2ab|$, then the value of B/A is _____.

[Watch Video Solution](#)

Exercise 12 3

1. Prove that the value of each the following determinants zero:

$$(a) \begin{vmatrix} a_1 & la_1 + mb_1 & b_1 \\ a_2 & la_2 + mb_2 & b_2 \\ a_3 & la_3 + mb_3 & b_3 \end{vmatrix}$$



[Watch Video Solution](#)

2. using properties of determinants evaluate

$$\begin{vmatrix} 18 & 40 & 89 \\ 40 & 89 & 198 \\ 89 & 198 & 440 \end{vmatrix}$$



[Watch Video Solution](#)

3. Prove that $\begin{vmatrix} 18 & 40 & 89 \\ 40 & 89 & 198 \\ 89 & 198 & 440 \end{vmatrix} = 3abc - a^3 - b^3 - c^3$



[View Text Solution](#)

4. Show that $|11 + p1 + p + q23 + 2p1 + 3p + 2q36 + 3p106p + 3q| = 1$.

 [Watch Video Solution](#)

5. Show that
$$\begin{vmatrix} a-x & c & b \\ c & b-x & a \\ b & a & c-x \end{vmatrix} = 0$$

where $a + b + c \neq 0$

 [View Text Solution](#)

6. Show that:

$$|3a - a + b - a + c - b + a3b - b + c - c + a - c + b3c| = 3(a + b + c)(ab + bc + ca)$$

 [Watch Video Solution](#)

7. Using properties of determinants Prove that

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



Watch Video Solution

8. Solve

$$\begin{vmatrix} x^2 - 1 & x^2 + 2x + 1 & 2x^2 + 3x + 1 \\ 2x^2 + x - 1 & 2x^2 + 5x - 3 & 4x^2 + 4x - 3 \\ 6x^2 - x - 2 & 6x^2 - 7x + 2 & 12x^2 - 5x - 2 \end{vmatrix} = 0$$



Watch Video Solution

9. Show that

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



Watch Video Solution

10. Show that if $x_1, x_2, x_3 \neq 0$

$$\begin{vmatrix} x_1 + a_1b_1 & a_1b_2 & a_1b_3 \\ a_2b_1 & x_2 + a_2b_2 & a_2b_3 \\ a_3b_1 & a_3b_2 & x_3 + a_3b_3 \end{vmatrix}$$

$$= x_1x_2x_3 \left(1 + \frac{a_1b_1}{x_1} + \frac{a_2b_2}{x_2} + \frac{a_3b_3}{x_3} \right)$$



Watch Video Solution

11. If A, B and C are the angles of a triangle, show that

$$-1 + \cos B \cos C + \cos C \cos A + \cos A \cos B - 1 + \cos A - 1 + \cos B - 1 + \cos A - 1$$



Watch Video Solution

12. If $\begin{vmatrix} a^2 & b^2 & c^2 \\ (a+b)^2 & (b+1)^2 & (c+1)^2 \\ (a-1)^2 & (b-1)^2 & (c-1)^2 \end{vmatrix} = k(a-b)(b-c)(c-a)$ then the value of

k is a. 4 b. -2 c. -4 d. 2



Watch Video Solution

13. Prove that $\Delta = \begin{vmatrix} 1 & 1 & 1 \\ a & b & c \\ bc + 1^2 & ac + b^2 & ab + c^2 \end{vmatrix}$

$$= 2(a - b)(b - c)(c - 1)$$



Watch Video Solution

14. Evaluate $\begin{vmatrix} \cdot^x C_1 & \cdot^x C_2 & \cdot^x C_3 \\ \cdot^y C_1 & \cdot^y C_2 & \cdot^y C_3 \\ \cdot^z C_1 & \cdot^z C_2 & \cdot^z C_3 \end{vmatrix}$



Watch Video Solution

15. if $\Delta_r = \begin{vmatrix} 2^{r-1} & 2 \times 3^{r-1} & 4 \times 5^{r-1} \\ \alpha & \beta & \gamma \\ 2^n - 1 & 3^n - 1 & 5^n - 1 \end{vmatrix}$

then find the value of $\sum_{r=1}^n \Delta_r$.



[Watch Video Solution](#)

16. Prove that

$$|1 + a11111 + b11111 + c11111 + d| = abcd \left(a + \frac{1}{a} + \frac{1}{b} + \frac{1}{c} + \frac{1}{d} \right). \quad \text{Hence}$$

find the value of the determinant if a, b, c, d are the roots of the equation

$$px^4 + qx^3 + rx^2 + sx + t = 0.$$



[Watch Video Solution](#)

17. Prove that

$$\begin{vmatrix} 1 & ab & \frac{1}{a} + \frac{1}{b} \\ 1 & bc & \frac{1}{b} + \frac{1}{c} \\ 1 & ca & \frac{1}{c} + \frac{1}{a} \end{vmatrix} = 0$$

 [Watch Video Solution](#)

18. Prove the identities: $\left| b^2 + c^2abacbac^2 + a^2bacba^2 + b^2 \right| = 4a^2b^2c^2$

 [Watch Video Solution](#)

19. Show that

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

 [Watch Video Solution](#)

Exercise 12 4

1. If x_1, x_2, x_3 as well as y_1, y_2, y_3 are in G.P. with same common ratio, then prove that the points (x_1, y_1) , (x_2, y_2) , and (x_3, y_3) are collinear.



[Watch Video Solution](#)

2. If lines $px + qy + r = 0$, $qx + ry + p = 0$ and $rx + py + q = 0$ are concurrent, then prove that $p + q + r = 0$ (where p, q, r are distinct).



[Watch Video Solution](#)

3. If
 $(x_1, x_2)^2 + (y_1 - y_2)^2 = a^2$, $(x_2 - x_3)^2 + (y_2 - y_3)^2 = b^2$, $(x_3 - x_1)^2 + (y_3 - y_1)^2 = c^2$

where a, b, c are positive then prove that

$$4 \begin{vmatrix} x_1 & y_1 & 1 \\ x_2 & y_2 & 1 \\ x_3 & y_3 & 1 \end{vmatrix} = (a + b + c)(b + c - a)(c + a - b)(a + b - c)$$

 [Watch Video Solution](#)

4. It is known that the equation of hyperbola and that of its pair of asymptotes differ by constant. If equation of hyperbola is $x^2 + 4xy + 3y^2 - 4x + 2y + 1 = 0$ then find the equation of its pair of asymptotes.

 [Watch Video Solution](#)

Exercise 12.5

1. Prove that

$$|(b+x)(c+x)(v+x)(a+x)(a+x)(b+x)(b+y)(c+y)(c+x)(a+t)(a+y)(b+y)(b$$

[Watch Video Solution](#)

$$2. \Delta = \begin{vmatrix} 1 + a^2 + a^4 & 1 + ab + a^2b^2 & 1 + ac + a^2c^2 \\ 1 + ab + a^2b^2 & 1 + b^2 + b^4 & 1 + bc + b^2c^2 \\ 1 + ac + a^2c^2 & 1 + bc + b^2c^2 & 1 + c^2 + c^4 \end{vmatrix} \text{ is equal to}$$

[Watch Video Solution](#)

3. Prove that

$$|2\alpha + \beta + \gamma + \delta| \alpha\beta + \gamma\delta \alpha + \beta + \gamma + \delta = 2(\alpha + \beta)(\gamma + \delta)\alpha\beta(\gamma + \delta) + \gamma\delta(\alpha + \beta)\alpha\beta + \gamma\delta\alpha\beta(\gamma + \delta)$$

[Watch Video Solution](#)

4. For all values of A, B, C and P, Q, R show that

$$|\cos(A - P)\cos(A - Q)\cos(A - R)\cos(B - P)\cos(B - Q)\cos(B - R)\cos(C - P)\cos(C - Q)|$$

[Watch Video Solution](#)

5. Show that: $\left| b^2 + c^2 abacbac^2 + a^2 bacba^2 + b^2 \right| = 4a^2 b^2 c^2$

 [Watch Video Solution](#)

6. Express $\left| 2bc - a^2 c^2 b^2 c^2 2ca - b^2 a^2 b 6 2 a^2 2 ab - c^2 \right|$ as square of a determinant of hence evaluate if.

 [Watch Video Solution](#)

Exercise 12.6

1.

Let

$$f(x) = \left| \cos(x + x^2) \sin(x + x^2) - \cos(x + x^2) \sin(x - x^2) \cos(x - x^2) \sin(x - x^2) \sin 2x \right|$$

. Find the value of $f'(0)$

 [Watch Video Solution](#)

2. If $f(x), g(x)$ and $h(x)$ are three polynomials of degree 2, then prove that $\varphi(x) = |f(x)g(x)h(x)f'(x)g'(x)h'(x)f''(x)g''(x)h''(x)|$ is a constant polynomial.

 [Watch Video Solution](#)

3. If $g(x) = \frac{f(x)}{(x-a)(x-b)(x-c)}$, where $f(x)$ is a polynomial of degree < 3 , then prove that

$$\frac{dg(x)}{dx} = \left| 1af(a)(x-a)^{-2}1bf(b)(x-b)^{-2}1cf(c)(x-c)^{-2} \right| + \left| a^2a1b^2b1c^2c1 \right|$$

 [Watch Video Solution](#)

4. If $f(x) = \begin{vmatrix} \cos(x + \alpha) & \cos(x + \beta) & \cos(x + \gamma) \\ \sin(x + \alpha) & \sin(x + \beta) & \sin(x + \gamma) \\ \sin(\beta - \gamma) & \sin(\gamma - \alpha) & \sin(\alpha - \beta) \end{vmatrix}$ and

$f(0) = 2$ then find the value of $\sum_{r=1}^{30} |f(r)|$.

 [Watch Video Solution](#)

5. $f(x) = \begin{vmatrix} \cos x & x & 1 \\ 2\sin x & x^2 & 2x \\ \tan x & x & 1 \end{vmatrix}$ then find the value of

$$\lim_{x \rightarrow 0} \frac{f(x)}{x}$$

 [Watch Video Solution](#)

Exercise 12 7

1. Find the following system of equations is consistent,

$$(a + 1)^3x + (a + 2)^3y = (a + 3)^3, \quad (a + 1)x + (a + 2)y = a + 3, \quad x + y = 1, \quad \text{then}$$

find the value of a

 [Watch Video Solution](#)

2. Solve the system of the equations: $ax + by + cz = d$ $a^2x + b^2y + c^2z = d^2$

$a^3x + b^3y + c^3z = d^3$ Will the solution always exist and be unique?

 [Watch Video Solution](#)

3. consider the system of equations : $3x - y + 4z = 3$

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

$$6x + 5y + \lambda z = -3$$

Prove that system of equation has at least one solution for all real values of λ . also prove that infinite solutions of the system of equations satisfy

$$\frac{7x - 4}{-5} = \frac{7y + 9}{13} = z$$



[View Text Solution](#)

4. If the equation $2x + 3y + 1 = 0$, $3x + y - 2 = 0$, and $ax + 2y - b = 0$ are consistent, then prove that $a - b = 2$.



[Watch Video Solution](#)

5. if x, y and z are not all zero and connected by the equations

$$a_1x + b_1y + c_1z = 0, a_2x + b_2y + c_2z = 0$$

and

$(p_1 + \lambda q_1)x + (p_2 + \lambda q_2)y + (p_3 + \lambda q_3)z = 0$ show that

$$\lambda = - \frac{\begin{vmatrix} a_1 & b_1 & c_1 \\ a_2 & b_2 & c_2 \\ p_1 & p_2 & p_3 \end{vmatrix}}{\begin{vmatrix} a_1 & b_1 & c_1 \\ a_2 & b_2 & c_2 \\ q_1 & q_2 & q_3 \end{vmatrix}}$$



[Watch Video Solution](#)

Exercise Single

1. If $\theta \in R$ then maximum value of $\Delta = \begin{vmatrix} 1 & 1 & 1 \\ 1 & 1 + \sin\theta & 1 \\ 1 & 1 & 1 + \cos\theta \end{vmatrix}$ is

A. $\sqrt{3}/2$

B. $1/2$

C. $1/\sqrt{2}$

D. None of these

Answer: B



Watch Video Solution

2. If $p + q + r = a + b + c = 0$, then the determinant $\begin{vmatrix} pa & qb & rc \\ qc & ra & pb \\ rb & pc & qa \end{vmatrix}$ equals

A. 0

B. $pa + qb + rc$

C. 1

D. none of these

Answer: A



Watch Video Solution

3. If α, β, γ are the roots of $px^2 + qx^2 + r = 0$, then the value of the determinant $|\alpha\beta\beta\gamma\gamma\alpha\beta\gamma\gamma\alpha\alpha\beta\gamma\alpha\alpha\beta\beta\gamma|$ is p b. q c. 0 d. r

A. p

B. q

C. 0

D. r

Answer: C



Watch Video Solution

4. If $f(x) = a + bx + cx^2$ and α, β, γ are the roots of the equation $x^3 = 1$, then $|abc|$ is equal to $f(\alpha) + f(\beta) + f(\gamma)$
 $f(\alpha)f(\beta) + f(\beta)f(\gamma) + f(\gamma)f(\alpha) - f(\alpha)f(\beta)f(\gamma)$

A. $f(\alpha) + f(\beta) + f(\gamma)$

B. $f(\alpha)f(\beta) + f(\beta)f(\gamma) + f(\gamma)f(\alpha)$

C. $f(\alpha)f(\beta)f(\gamma)$

D. $-f(\alpha)f(\beta)f(\gamma)$

Answer: D



Watch Video Solution

5. If $[x]$ denotes the greatest integer less than or equal to the real number under consideration, and $-1 \leq x < 0$, $0 \leq y < 1$, $1 \leq a < 2$, then the value of the determinant $|\begin{vmatrix} [x] + 1 & [y] & [z] \\ [x] & [y] + 1 & [z] \\ [x] & [y] & [z] + 1 \end{vmatrix}$ is [x] b. [y] c. [z] d. none of these

A. [x]

B. [y]

C. [z]

D. none of these

Answer: C



Watch Video Solution

6. If $a = \cos\theta + i\sin\theta$, $b = \cos 2\theta - i\sin 2\theta$, $c = \cos 3\theta + i\sin 3\theta$ and if

$$\begin{vmatrix} a & b & c \\ b & c & a \\ c & a & b \end{vmatrix} = 0 \text{ then}$$

A. $\theta = 2k\pi, k \in Z$

B. $\theta = (2k + 1)\pi, k \in Z$

C. $\theta = (4k + 1)\pi, k \in Z$

D. none of these

Answer: A

 [View Text Solution](#)

7. If $\begin{vmatrix} x^n & x^{n+2} & x^{n+3} \\ y^n & y^{n+2} & y^{n+3} \\ z^n & z^{n+2} & z^{n+3} \end{vmatrix} = (x - y)(y - z)(z - x) \left(\frac{1}{x} + \frac{1}{y} + \frac{1}{z} \right)$, then n equals

A. 1

B. -1

C. 2

D. -2

Answer: B



Watch Video Solution

8. If the determinant $\begin{vmatrix} \cos 2x & \sin^2 x & \cos 4x \\ \sin^2 x & \cos 2x & \cos^2 x \\ \cos 4x & \cos^2 x & \cos 2x \end{vmatrix}$ is expanded in powers of $\sin x$

, then the constant term is

A. 1

B. 0

C. -1

D. 2

Answer: C



Watch Video Solution

9. If a determinant of order 3×3 is formed by using the numbers 1 or -1 then minimum value of determinant is :

A. -2

B. -4

C. 0

D. -8

Answer: B



Watch Video Solution

10. If $A + B + C = \pi$ and $e^{i\theta} = \cos\theta + i\sin\theta$ and $z = \begin{vmatrix} e^{2iA} & e^{-iC} & e^{-iB} \\ e^{-iC} & e^{2iB} & e^{-iA} \\ e^{-iB} & e^{-iA} & e^{2iC} \end{vmatrix}$, then

A. 1

B. -1

C. -2

D. -4

Answer: D

 [Watch Video Solution](#)

11. If a, b, c are different, then the value of x for which

$$\begin{vmatrix} 0 & x^2 - a & x^3 - b \\ x^2 + a & 0 & x^2 + c \\ x^4 + b & x - c & 0 \end{vmatrix} = 0 \text{ is}$$

A. a

B. c

C. b

D. 0

Answer: D



Watch Video Solution

12. if the value of the determinant $\begin{vmatrix} a & 1 & 1 \\ 1 & b & 1 \\ 1 & 1 & c \end{vmatrix}$ is positive then

$(a, b, c < 0)$

A. $abc > 1$

B. $abc > -8$

C. $abc > -9$

D. $abc > -2$

Answer: B



[Watch Video Solution](#)

13. if A_1, B_1, C_1, \dots are respectively the cofactors of the elements a_1, b_1, c_1, \dots of the determinant

$$\Delta = \begin{vmatrix} a_1 & b_1 & c_1 \\ a_2 & b_2 & c_2 \\ a_3 & b_3 & c_3 \end{vmatrix}, \Delta \neq 0 \text{ then the value of } \begin{vmatrix} B_2 & C_2 \\ B_3 & C_3 \end{vmatrix} \text{ is equal to}$$

A. $a_1^2 \Delta$

B. $a_1 \Delta$

C. $a_1 \Delta^2$

D. $a_1^2 \Delta^2$

Answer: B



[View Text Solution](#)

14. If $a, b, c, d, e,$ and f are in G.P. then the value of $\left| a^2 d^2 x b^2 e^2 y c^2 f^2 z \right|$ depends on x and y b. x and z c. y and z d. independent of $x, y,$ and z

A. x and y

B. x and z

C. y and z

D. independent of x, y and z

Answer: D



[Watch Video Solution](#)

15. Let $x < 1$, then value of $\left| x^2 + 22x + 112x + 1x + 21331 \right|$ is a. non-negative b. non-positive c. negative d. positive

A. non-negative

B. non-positive

C. begative

D. positive

Answer: C



Watch Video Solution

16. The value of $\begin{vmatrix} -1 & 2 & 1 \\ 3 + 2\sqrt{2} & 2 + 2\sqrt{2} & 1 \\ 3 - 2\sqrt{2} & 2 - 2\sqrt{2} & 1 \end{vmatrix}$ is equal to

A. 0

B. $-16\sqrt{2}$

C. $-8\sqrt{2}$

D. none of these

Answer: B



Watch Video Solution

17. Let $\{D_1, D_2, D_3, D_n\}$ be the set of third order determinant that can be made with the distinct non-zero real numbers a_1, a_2, a_q . Then

$\sum_{i=1}^n D_i = 1$ b. $\sum_{i=1}^n D_i = 0$ c. $D_i - D_j, \forall i, j$ d. none of these

A. $\sum_{i=1}^n D_i = 1$

B. $\sum_{i=1}^n D_i = 0$

C. $D_i D_j, \forall i, j$

D. None of these

Answer: B

 [Watch Video Solution](#)

18. if w is a complex cube root to unity then value of

$$\Delta = \begin{vmatrix} a_1 + b_1 w & a_1 w^2 + b_1 & c_1 + b_1 \bar{w} \\ a_2 + b_2 w & a_2 w^2 + b_2 & c_2 + b_2 \bar{w} \\ a_3 + b_3 w & a_3 w^2 + b_3 & c_3 + b_3 \bar{w} \end{vmatrix} \text{ is}$$

A. 0

B. -1

C. 2

D. none of these

Answer: A



Watch Video Solution

19. If $a + b + c = 0$, one root of $|a - xcbcb - xabac - x| = 0$ is $x = 1$ b. $x = 2$ c.

$x = a^2 + b^2 + c^2$ d. $x = 0$

A. $x = 1$

B. $x = 2$

C. $x = a^2 + b^2 + c^2$

D. $x = 0$

Answer: D

 [Watch Video Solution](#)

20. If x, y, z are in A.P., then the values of the determinant

$$\begin{vmatrix} a+2 & a+3 & a+2y \\ a+3 & a+4 & a+2y \\ a+4 & a+5 & a+2z \end{vmatrix}, \text{ is}$$

A. 1

B. 0

C. $2a$

D. a

Answer: B

 [Watch Video Solution](#)

21. If a_1, a_2, a_3, \dots are in G.P. then the value of determinant

$$\begin{vmatrix} \log(a_n) & \log(a_{n+1}) & \log(a_{n+2}) \\ \log(a_{n+3}) & \log(a_{n+4}) & \log(a_{n+5}) \\ \log(a_{n+6}) & \log(a_{n+7}) & \log(a_{n+8}) \end{vmatrix} \text{ equals}$$

A. 1

B. 0

C. $2a$

D. a

Answer: B



[Watch Video Solution](#)

22. Value of $|x + yzzxy + zxyyz + x|$, where x, y, z are nonzero real number, is equal to xyz b. $2xyz$ c. $3xyz$ d. $4xyz$

A. xyz

B. $2xyz$

C. $3xyz$

D. $4xyz$

Answer: D



[Watch Video Solution](#)

23. Which of the following is not the root of the equation

$$|x - 6 - 12 - 3 \times - 3 - 32 \times + 2| = 0? \text{ 2 b. 0 c. 1 d. -3}$$

A. 2

B. 0

C. 1

D. -3

Answer: B



[Watch Video Solution](#)

24. The value of the determinant $\begin{vmatrix} kak^2 + a^21kbbk^2 + b^21kck^2 + c^21 \end{vmatrix}$ is

$$k(a+b)(b+c)(c+a) \qquad kabc(a^2 + b^2 + c^2) \qquad k(a-b)(b-c)(c-a)$$

$$k(a+b-c)(b+c-a)(c+a-b)$$

A. $k(a+b)(b+c)(c+a)$

B. $kabc(a^2 + b^2 + c^2)$

C. $k(a-b)(b-c)(c-a)$

D. $k(a+b-c)(b+c-a)(c+a-b)$

Answer: C



Watch Video Solution

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

where a, b, c are all different, then the determinant

$$\begin{vmatrix} 1 & 1 & 1 \\ (x-a)^2 & (x-b)^2 & (x-c)^2 \\ (x-b)(x-c) & (x-c)(x-a) & (x-a)(x-b) \end{vmatrix} \text{ vanishes when}$$

A. $a + b + c = 0$

B. $x = \frac{1}{3}(a + b + c)$

C. $x = \frac{1}{2}(a + b + c)$

D. $x = a + b + c$

Answer: B



Watch Video Solution

26. if $f(x) = \begin{vmatrix} mx & mx - p & mx - p \\ n & n + p & n - p \\ mx + 2n & mx + 2n + p & mx + 2n - p \end{vmatrix}$ then

$y=f(x)$ represents

A. a straight line parallel to x-axis

B. a straight line parallel to y-axis

C. parabola

D. a straight line with negative slope

Answer: B



Watch Video Solution

27. if $\begin{vmatrix} x & 3 & 6 \\ 3 & 6 & x \\ 6 & x & 3 \end{vmatrix} = \begin{vmatrix} 2 & x & 7 \\ x & 7 & 2 \\ 7 & 2 & x \end{vmatrix} = \begin{vmatrix} 4 & 5 & x \\ 5 & x & 4 \\ x & 4 & 5 \end{vmatrix} = 0$ then x is equal

to

A. 0

B. -9

C. 3

D. none of these

Answer: B



Watch Video Solution

28. If $\left| x^n x^{n+2} x^{2n} 1 x^a a x^{n+5} x^{a+6} x^{2n+5} \right| = 0, \forall x \in R, \text{ where } n \in N,$ then value of a is n b. $n - 1$ c. $n + 1$ d. none of these

A. n

B. $n-1$

C. $n+1$

D. none of these

Answer: C

 [Watch Video Solution](#)

29. for the equation $\begin{vmatrix} 1 & x & x^2 \\ x^2 & 1 & x \\ x & x^2 & 6 \end{vmatrix} = 0$

A. There are exactly two distinct roots

B. there is one pair of equation real roots

C. There are three pairs of equal roots

D. Modulus of each root is 2

Answer: C



Watch Video Solution

30. If $a^2 + b^2 + c^2 = -2$ and $f(x) =$

$$\left| a + a^2x(1 + b^2)x(1 + c^2)x(1 + a^2)x1 + b^2x(1 + c^2)x(1 + a^2)x(1 + b^2)x1 + c^2x \right|$$

, then $f(x)$ is a polynomial of degree 0 b. 1 c. 2 d. 3

A. 0

B. 1

C. 2

D. 3

Answer: C



Watch Video Solution

31. The value of the determinant $\begin{vmatrix} 1 & 1 & 1 \\ {}^m C_1 & {}^{m+1} C_1 & {}^{m+2} C_1 \\ {}^m C_2 & {}^{m+1} C_2 & {}^{m+2} C_2 \end{vmatrix}$ is equal to

A. 1

B. -1

C. 0

D. none of these

Answer: A



Watch Video Solution

32. the value of the determinant

$$\begin{vmatrix} {}^n C_{r-1} & {}^n C_r & (r+1)^{n+2} C_{r+1} \\ {}^n C_r & {}^n C_{r+1} & (r+2)^{n+2} C_{r+2} \\ {}^n C_{r+1} & {}^n C_{r+2} & (r+3)^{n+2} C_{r+3} \end{vmatrix} \text{ is}$$

A. $n^2 + n - 1$)

B. 0

C. ${}^{n+3} C_{r+3}$

D. ${}^n C_{r-1} + {}^n C_r + {}^n C_{r+1}$

Answer: B



View Text Solution

33. if $f(x) = \begin{vmatrix} x & a & a \\ a & x & a \\ a & a & x \end{vmatrix} = 0$ then

A. $f(x) = 0$ and $f(x) = 0$ has one common root

B. $f(x) = 0$ and $f(x) = 0$ has one common root

C. sum of roots of $f(x) = 0$ is $-3a$

D. none of these

Answer: B

 [Watch Video Solution](#)

34. If $x \neq y \neq z$ and
$$\begin{vmatrix} x & x^2 & 1+x^3 \\ y & y^2 & 1+y^3 \\ z & z^2 & 1+z^3 \end{vmatrix} = 0,$$
 then $xyz =$

A. 1

B. 2

C. -1

D. -2

Answer: C



Watch Video Solution

35. if $x \neq 0, y \neq 0, z \neq 0$ and $\begin{vmatrix} 1+x & 1 & 1 \\ 1+y & 1+2y & 1 \\ 1+z & 1+z & 1+3z \end{vmatrix} = 0$ then

$x^{-1} + y^{-1} + z^{-1}$ is equal to

A. -1

B. -2

C. -3

D. none of these

Answer: C



Watch Video Solution

36. if $a_1b_1c_1$, $a_2b_2c_2$ and $a_3b_3c_3$ are three-digit even natural numbers and

$$\Delta = \begin{vmatrix} c_1 & a_1 & b_1 \\ c_2 & a_2 & b_2 \\ c_3 & a_3 & b_3 \end{vmatrix} \text{ then } \Delta \text{ is}$$

- A. divisible by 2 but not necessarily by 4
- B. divisible by 4 but not necessarily by 8
- C. divisible by 8
- D. none of these

Answer: A

 [Watch Video Solution](#)

37. if $\begin{vmatrix} b+c & c+a & a+b \\ a+b & b+c & c+a \\ c+a & a+b & b+c \end{vmatrix} = k \begin{vmatrix} a & b & c \\ c & a & b \\ b & c & a \end{vmatrix}$ then the value of k is

- A. 1

B. 2

C. 3

D. 4

Answer: B



Watch Video Solution

38. suppose $D = \begin{vmatrix} a_1 & b_1 & c_1 \\ a_2 & b_2 & c_2 \\ a_3 & b_3 & c_3 \end{vmatrix}$ and

$$D' = \begin{vmatrix} a_1 + pb_1 & b_1 + qc_1 & c_1 + ra_1 \\ a_2 + pb_2 & b_2 + qc_2 & c_2 + ra_2 \\ a_3 + pb_3 & b_3 + qc_3 & c_3 + ra_3 \end{vmatrix}. \text{ Then}$$

A. $D' = D$

B. $D' = D(1 - pqr)$

C. $D = D(1 + p + q + r)$

$$D. D' = D(1 + pqr)$$

Answer: D



Watch Video Solution

39. The value of the determinant

$$\begin{vmatrix} \log_a \left(\frac{x}{y} \right) & \log_a \left(\frac{y}{z} \right) & \log_a \left(\frac{z}{x} \right) \\ \log_b \left(\frac{y}{z} \right) & \log_b \left(\frac{z}{x} \right) & \log_b \left(\frac{x}{y} \right) \\ \log_c \left(\frac{z}{x} \right) & \log_c \left(\frac{x}{y} \right) & \log_c \left(\frac{y}{z} \right) \end{vmatrix}$$

A. 1

B. -1

C. 0

D. $\frac{1}{6} \log_a xyz$

Answer: C



Watch Video Solution

40. If $a > 0, b > 0, c > 0$ are respectively the p th, q th, r th terms of a G.P., then the value of the determinant

$$\begin{vmatrix} \log a & p & 1 \\ \log b & q & 1 \\ \log c & r & 1 \end{vmatrix}, \text{ is}$$

- A. 0
- B. $\log(abc)$
- C. $-(p + q + r)$
- D. none of these

Answer: A



Watch Video Solution

41. If $a > 0$ and discriminant of $ax^2 + 2bx + c$ is negative, then

= $abax + cbx + cax + x + c0$ is +ve b. $(ac - b)^2(ax^2 + 2bx + c)$ c. -ve d. 0

A. +ve

B. $(ac - b)^2 (ax^2 + 2bx + c)$

C. -ve

D. 0

Answer: C



Watch Video Solution

42. The number of distinct real roots of $\begin{vmatrix} \sin x & \cos x & \cos x \\ \cos x & \sin x & \cos x \\ \cos x & \cos x & \sin x \end{vmatrix} = 0$ in the interval $-\frac{\pi}{4} \leq x \leq \frac{\pi}{4}$ is

A. 0

B. 2

C. 1

D. 3

Answer: C



Watch Video Solution

43. if $D_k = \begin{vmatrix} 1 & n & n \\ 2k & n^2 + n + 1 & n^2 + n \\ 2k - 1 & n^2 & n^2 + n + 1 \end{vmatrix}$ and $\sum_{k=1}^n D_k = 56$ then n

equals

A. 4

B. 6

C. 8

D. 7

Answer: D



Watch Video Solution

44. the value of $\sum_{r=2}^n (-2)^r \begin{vmatrix} {}^{n-2}C_{r-2} & {}^{n-2}C_{r-1} & {}^{n-2}C_r \\ -3 & 1 & 1 \\ 2 & -1 & 0 \end{vmatrix} (n > 2)$

A. $2n - 1 + (-1)^n$

B. $2n + 1 + (-1)^{n-1}$

C. $2n - 3 + (-1)^n$

D. none of these

Answer: A

 [View Text Solution](#)

45. if $\Delta = \begin{vmatrix} 3 & 4 & 5 & x \\ 4 & 5 & 6 & y \\ 5 & 6 & 7 & z \\ x & y & z & 0 \end{vmatrix} = 0$ then

A. x, y, z are in A.P.

B. x, y, z are in G.P

C. x, y, z are in H.P

D. none of these

Answer: A



Watch Video Solution

46. Roots of the equations
$$\begin{vmatrix} x & m & n & 1 \\ a & x & n & 1 \\ a & b & x & 1 \\ a & b & c & 1 \end{vmatrix} = 0$$
 are

A. independent of m and n

B. independent of a, b and c

C. depend on m, n and a, b, c

D. independent of m, n and a, b, c

Answer: A



Watch Video Solution

47. If x, y, z are different from zero and

$ab - yc - za - xbc - za - xb - yc = 0$, then the value of the

expression $\frac{a}{x} + \frac{b}{y} + \frac{c}{z}$ is 0 b. -1 c. 1 d. 2

A. 0

B. -1

C. 1

D. 2

Answer: D



Watch Video Solution

48. The number of positive integral solutions of the equation

$$\begin{vmatrix} x^3 + 1 & x^2y & x^2z \\ xy^2 & y^3 + 1 & y^2z \\ xz^2 & z^2y & z^3 + 1 \end{vmatrix} = 11 \text{ is}$$

A. 0

B. 3

C. 6

D. 12

Answer: B



Watch Video Solution

49. In triangle ABC, if

$$\left| \begin{array}{ccc} 1 & 1 & 1 \\ \cot\left(\frac{A}{2}\right) & \cot\left(\frac{B}{2}\right) & \cot\left(\frac{C}{2}\right) \\ \tan\left(\frac{B}{2}\right) + \tan\left(\frac{C}{2}\right) & \tan\left(\frac{C}{2}\right) + \tan\left(\frac{A}{2}\right) & \tan\left(\frac{A}{2}\right) + \tan\left(\frac{B}{2}\right) \end{array} \right| \text{ then the}$$

triangle must be (A) Equilateral (B) Isosceles (C) Right Angle (D) none of these

- A. equilateral
- B. isosceles
- C. obtuse angled
- D. none of these

Answer: B



Watch Video Solution

50. If $\begin{vmatrix} a & b-c & b+c \\ a+c & b & c-a \\ a-b & a+b & c \end{vmatrix} = 0$ then the line $ax + by + c = 0$ passes

through the fixed point which is

A. (1, 2)

B. (1, 1)

C. (-2, 1)

D. (1, 0)

Answer: B



Watch Video Solution

51. The determinant $\begin{vmatrix} y^2 & -xy & x^2 \\ a & b & c \\ a' & b' & c' \end{vmatrix}$ is equal to

A. $\begin{vmatrix} bx + ay & cx + by \\ b'x + a'y & c'x + b'y \end{vmatrix}$

$$B. \begin{vmatrix} ax + by & bx + cy \\ a'x + b'y & b'x + c'y \end{vmatrix}$$

$$C. \begin{vmatrix} bx + cy & ax + by \\ b'x + c'y & a'x + b'y \end{vmatrix}$$

$$D. \begin{vmatrix} ax + by & bc + cy \\ a'x + b'y & b'x + c'y \end{vmatrix}$$

Answer: D



Watch Video Solution

52. Let $\vec{a}_r = x_r \hat{i} + y_r \hat{j} + z_r \hat{k}$, $r = 1, 2, 3$ three mutually perpendicular unit

vectors then the value of $\begin{vmatrix} x_1 & -x_2 & x_3 \\ y_1 & y_2 & y_3 \\ z_1 & z_2 & z_3 \end{vmatrix}$ is equal to

A. zero

B. ± 1

C. ± 2

D. none of these

Answer: B



Watch Video Solution

53. Let

$$\begin{vmatrix} y^5 z^6 (z^3 - y^3) & x^4 z^6 (x^3 - z^3) & x^4 y^5 (y^3 - x^3) \\ y^2 z^3 (y^6 - z^6) & xz^3 (z^6 - x^6) & xy^2 (x^6 - y^6) \\ y^2 \wedge (3) (z^3 - y^3) & xz^3 (x^3 - z^3) & xy^2 (y^3 - x^3) \end{vmatrix} \text{ and } \Delta_2 = \begin{vmatrix} x & y^2 & z^3 \\ x^4 & y^5 & z^6 \\ x^7 & y^8 & z^9 \end{vmatrix}$$

.Then $\Delta_1 \Delta_2$ is equal to

A. Δ_2^6

B. Δ_2^4

C. Δ_2^3

D. Δ_2^2

Answer: C



Watch Video Solution

54. the value of the determinant

$$\begin{vmatrix} (a_1 - b_1)^2 & (a_1 - b_2)^2 & (a_1 - b_3)^2 & (a_1 - b_4)^2 \\ (a_2 - b_1)^2 & (a_2 - b_2)^2 & (a_2 - b_3)^2 & (a_3 - b_4)^2 \\ (a_3 - b_1)^2 & (a_3 - b_2)^2 & (a_3 - b_3)^2 & (a_3 - b_4)^2 \\ (a_4 - b_1)^2 & (a_4 - b_2)^2 & (a_4 - b_3)^2 & (a_4 - b_4)^2 \end{vmatrix} \text{ is}$$

- A. dependant on $a_i, i = 1, 2, 3, 4$
- B. dependant on $b_i, i = 1, 2, 3, 4$
- C. dependant on $a_{ij}, b_i, i = 1, 2, 3, 4$
- D. 0

Answer: D



Watch Video Solution

55. if $\Delta(x) = \begin{vmatrix} \tan x & \tan(x+h) & \tan(x+2h) \\ \tan(x+2h) & \tan x & \tan(x+h) \\ \tan(x+h) & \tan(x+2h) & \tan x \end{vmatrix}$, then

The value of $\lim_{h \rightarrow 0} \frac{\Delta(\pi/3)}{\sqrt{3}h^2}$ is

A. 144

B. 81

C. 64

D. 36

Answer: A



[View Text Solution](#)

56. Value of $\begin{vmatrix} 1+x_1 & 1+x_1x & 1+x_1x^2 \\ 1+x_2 & 1+x_2x & 1+x_2x^2 \\ 1+x_3 & 1+x_3x & 1+x_3x^2 \end{vmatrix}$ depends upon

A. x only

B. x_1 only

C. x_2 only

D. none of these

Answer: D



Watch Video Solution

57.

If

$$\left| a^2 + \lambda^2 ab + c\lambda ca - b\lambda ab - c\lambda b^2 + \lambda^2 bc + aca + b\lambda bc - a\lambda c^2 + \lambda^2 \right| |\lambda c - b - c\lambda ab - a\lambda$$

, then the value of λ is 8 b. 27 c. 1 d. -1

A. 8

B. 27

C. 1

D. -1

Answer: C



Watch Video Solution

58. Let $\begin{vmatrix} x & 2 & x \\ x^2 & x & 6 \\ x & x & 6 \end{vmatrix} = ax^4 + bx^3 + cx^2 + dx + e$ Then, the value of

$5a + 4b + 3c + 2d + e$ is equal to

A. zero

B. -16

C. 16

D. -11

Answer: D



Watch Video Solution

59. If $\Delta_1 = \begin{vmatrix} x & b & b \\ a & x & b \\ a & a & x \end{vmatrix}$ and $\Delta_2 = \begin{vmatrix} x & b \\ a & x \end{vmatrix}$ are the given determinants

then

A. $\Delta_1 = 3(\Delta_2)^2$

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

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

D. $\Delta_1 = 3\Delta_2^{3/2}$

Answer: B



Watch Video Solution

60. if $y = \sin mx$, then the value of the determinant

$$\begin{vmatrix} y & y_1 & y_2 \\ y_3 & y_4 & y_5 \\ y_6 & y_7 & y_8 \end{vmatrix} \quad \text{Where } y_n = \frac{d^n y}{dx^n} \text{ is}$$

A. m^9

B. m^2

C. m^3

D. 0

Answer: D

 [Watch Video Solution](#)

61. Let $f(x) = \begin{vmatrix} 2\cos^2x & \sin 2x & -\sin x \\ \sin 2x & 2\sin^2x & \cos x \\ \sin x & -\cos x & 0 \end{vmatrix}$, then the value of $\int_0^{\pi/2} \{f(x) + f'(x)\} dx$

is

A. π

B. $\pi/2$

C. 2π

D. $3\pi/2$

Answer: A



[Watch Video Solution](#)

62. a, b, c are distinct real numbers not equal to one. If $ax + y + z = 0$, $x + by + z = 0$, and $x + y + cz = 0$ have nontrivial solution, then the value of $\frac{1}{1-a} + \frac{1}{1-b} + \frac{1}{1-c}$ is equal to 1 b. -1 c.zero d. none of these

A. -1

B. 1

C. zero

D. none of these

Answer: B



[Watch Video Solution](#)

63. If the system of linear equation $x + y + z = 6$, $x + 2y + 3z = 14$, and $2x + 5y + \lambda z = \mu$ ($\lambda, \mu \in \mathbb{R}$) has a unique solution, then $\lambda = 8$ b. $\lambda = 8, \mu = 36$ c. $\lambda = 8, \mu \neq 36$ d. none of these

A. $\lambda \neq 8$

B. $\lambda = 8, \mu \neq 36$

C. $\lambda = 8, \mu = 36$

D. none of these

Answer: A



[Watch Video Solution](#)

64. If α, β, γ are the angles of a triangle and system of equations

$$\cos(\alpha - \beta)x + \cos(\beta - \gamma)y + \cos(\gamma - \alpha)z = 0$$

$$\cos(\alpha + \beta)x + \cos(\beta + \gamma)y + \cos(\gamma + \alpha)z = 0$$

$\sin(\alpha + \beta)x + \sin(\beta + \gamma)y + \sin(\gamma + \alpha)z = 0$ has non-trivial solutions, then

triangle is necessarily a. equilateral b. isosceles c. right angled d. acute angled

A. equilateral

B. isosceles

C. right angled

D. acute angled

Answer: B



[Watch Video Solution](#)

65. Given $a = x/(y - z)$, $b = y/(z - x)$, and $c = z/(x - y)$, where x, y, z and z are not all zero, then the value of $ab + bc + ca$ is 0 b. 1 c. -1 d. none of these

A. 0

B. 1

C. -1

D. none of these

Answer: C

 [Watch Video Solution](#)

66. If $pqr \neq 0$ and the system of equation $(p + a)x + by - cz = 0$
 $ax + (q + b)y + cz = 0$ $ac + by + (r + c)z = 0$ has nontrivial solution, then
value of $\frac{1}{p} + \frac{b}{q} + \frac{c}{r}$ is -1 b. 0 c.0 d. ∞ - 2

A. -1

B. 0

C. 1

D. 2

Answer: A

 [Watch Video Solution](#)

67. The value of $|\alpha|$ for which the system of equation

$$\alpha x + y + z = \alpha - 1$$

$$x + \alpha y + z = \alpha - 1$$

$$x + y + \alpha z = \alpha - 1$$

has no solution, is _____

A. either -2 or 1

B. -2

C. 1

D. not-2

Answer: B



[Watch Video Solution](#)

68. the set of equations $\lambda x - y + (\cos\theta)z = 0, 3x + y + 2z = 0$, $(\cos\theta)$

$x+y+2z=0, \theta \leq 0 < 2\pi$ has non-trivial solution (s)

A. for no value of λ and 0

B. for all values of λ and 0

C. for all values of λ and only two values of 0

D. for only one value of λ and all values of 0

Answer: A



Watch Video Solution

69. If $c < 1$ and the system of equations $x + y - 1 = 0$, $2x - y - c = 0$, and $bx + 3by - c = 0$ is consistent, then the possible real values of b are

A. $b \in \left(-3\frac{3}{4} \right)$

B. $b \in \left(-\frac{3}{2}, 4 \right)$

C. $b \in \left(-\frac{3}{4}, 3 \right)$

D. none of these

Answer: C



Watch Video Solution

70. If a, b, c are in G.P. with common ratio r_1 and α, β, γ are in G.P. with common ratio r_2 and equations $ax + \alpha y + z = 0, bx + \beta y + z = 0, cx + \gamma y + z = 0$ have only zero solution, then which of the following is not true? a. $a + b + c$ b. abc c. 1 d. none of these

A. $r_1 \neq 1$

B. $r_2 \neq 1$

C. $r_1 \neq r_2$

D. none of these

Answer: D



Watch Video Solution

71. if the system of equations

$$(a - t)x + by + cz = 0$$

$$bx + (c - t)y + az = 0$$

$$cx + ay + (b - t)z = 0$$

has non-trivial solutions then product of all possible values of t is

A. $\begin{vmatrix} a & b & c \\ b & c & a \\ c & a & b \end{vmatrix}$

B. $a + b + c$

C. $a^2 + b^2 + c^2$

D. 1

Answer: A



[View Text Solution](#)

72. Let λ and α be real. Then the numbers of intergral values λ for which the system of linear equations

$$\lambda x + (\sin\alpha)y + (\cos\alpha)z = 0$$

$$x + (\cos\alpha)y + (\sin\alpha)z = 0$$

$-x + (\sin\alpha)y - (\cos\alpha)z = 0$ has non-trivial solutions is

A. 0

B. 1

C. 2

D. 3

Answer: D



[Watch Video Solution](#)

Exercise Multiple

1. Which of the following has/have value equal to zero ?

A.
$$\begin{vmatrix} 8 & 2 & 7 \\ 12 & 3 & 5 \\ 16 & 4 & 3 \end{vmatrix}$$

$$\text{B. } \begin{vmatrix} 1/a & a^2 & bc \\ 1/b & b^2 & ac \\ 1/c & c^2 & ab \end{vmatrix}$$

$$\text{C. } \begin{vmatrix} a+b & 2a+b & 3a+b \\ 2a+b & 3a+b & 4a+b \\ 4a+b & 5a+b & 6a+b \end{vmatrix}$$

$$\text{D. } \begin{vmatrix} 2 & 43 & 6 \\ 7 & 35 & 4 \\ 3 & 17 & 2 \end{vmatrix}$$

Answer: A::B::C



View Text Solution

$$2. \text{ If } f(\alpha, \beta) = \begin{vmatrix} \cos\alpha & -\sin\alpha & 1 \\ \sin\alpha & \cos\alpha & 1 \\ \cos(\alpha + \beta) & -\sin(\alpha + \beta) & 1 \end{vmatrix}, \text{ then}$$

A. $f(300,200)=f(400,200)$

B. $f(200,400)=f(200,600)$

C. $f(100,200)=f(200,200)$

D. none of these

Answer: A::C

 [Watch Video Solution](#)

3. if $f(\theta) = \begin{vmatrix} \sin\theta & \cos\theta & \sin\theta \\ \cos\theta & \sin\theta & \cos\theta \\ \cos\theta & \sin\theta & \sin\theta \end{vmatrix}$ then

A. $f(\theta) = 0$ has exactly 2 real solutions in $[0, \pi]$

B. $f(\theta) = 0$ has exactly 3 real solutions in $[0, \pi]$

C. range of function $\frac{f(\theta)}{1 - \sin 2\theta}$ is $[-\sqrt{2}, \sqrt{2}]$

D. range of function $\frac{f(\theta)}{\sin 2\theta - 1}$ is $[-3, 3]$

Answer: A::C

 [Watch Video Solution](#)

4. If $f(x) = \left| a - 10axa - 1ax^2axa \right|$, then $f(2x) - f(x)$ is divisible by a b. b c.c, d, e

d. none of these

A. x

B. a

C. $2a + 3x$

D. x^2

Answer: A::B::C



Watch Video Solution

5. $\Delta = \begin{vmatrix} 1 & 1 + ac & 1 + bc \\ 1 & 1 + ad & 1 + bd \\ 1 & 1 + ae & 1 + be \end{vmatrix}$ is independent of

A. a

B. b

C. c,d,e

D. none of these

Answer: A::B::C



Watch Video Solution

6. if $\Delta = \begin{vmatrix} -x & a & b \\ b & -x & a \\ a & b & -x \end{vmatrix}$ then a factor of Δ is

A. $a + b + x$

B. $x^2 - (a - b)x + a^2 + b^2 + ab$

C. $x^2 + (a + b)x + a^2 + b^2 - ab$

D. $a + b - x$

Answer: C::D



Watch Video Solution

7. the determinant $\Delta = \begin{vmatrix} a^2 + x & ab & ac \\ ab & b^2 + x & bc \\ ac & bc & c^2 + x \end{vmatrix}$ is divisible by

A. x

B. x^2

C. x^3

D. none of these

Answer: A::B



Watch Video Solution

8. $\begin{vmatrix} a^2 & 0 & 12a + b \\ a & b & 0 \\ 12a + 3b & 0 & 12a + 3b \end{vmatrix}$ is divisible by $a + b$ b. $a + 2b$ c. $2a + 3b$

d. a^2

A. $a + b$

B. $a + 2b$

C. $2a + 3b$

D. a^2

Answer: A:B



Watch Video Solution

9. the roots of the equations
$$\begin{vmatrix} \cdot^x C_r & \cdot^{n-1} C_r & \cdot^{n-1} C_{r-1} \\ \cdot^{x+1} C_r & \cdot^n C_r & \cdot^n C_{r-1} \\ \cdot^{x+2} C_r & \cdot^{n+1} C_r & \cdot^{n+1} C_{r-1} \end{vmatrix} = 0$$

A. $x = n$

B. $x = n + 1$

C. $x = n - 1$

D. $x = n - 2$

Answer: A:C



Watch Video Solution

10. If $f(x) = \begin{vmatrix} 3 & 3x & 3x^2 + 2a^2 \\ 3x & 3x^2 + 2a^2 & 3x^3 + 6a^2x \\ 3x^2 + 2a^2 & 3x^3 + 6a^2x & 3x^4 + 12a^2x^2 + 2a^4 \end{vmatrix}$ then

A. $f'(x)=0$

B. $y=f(x)$ is a straight line parallel to x-axis

C. $\int_0^2 f(x)dx = 32a^4$

D. none of these

Answer: A::B



Watch Video Solution

11. Let $f(n) = \begin{vmatrix} n & n+1 & n+1 \\ \cdot n P_n & \cdot^{n+1} P_{n+1} & \cdot^{n+2} P_{n+2} \\ \cdot n C_n & \cdot^{n+1} C_{n+1} & \cdot^{n+2} C_{n+2} \end{vmatrix}$ where the symbols have

their usual meanings .then $f(n)$ is divisible by

A. $n^2 + n + 1$

B. $(n + 1)!$

C. $n!$

D. none of these

Answer: A::C

 **Watch Video Solution**

12. the determinant $\begin{vmatrix} a & b & a\alpha + b \\ b & c & b\alpha + c \\ a\alpha + b & b\alpha + c & 0 \end{vmatrix} = 0$ is equal to zero if

A. a, b, c are in A.P

B. a, b, c are in G.P.

C. α is a root of the equation $ax^2 + bx + c = 0$

D. $(x - \alpha)$ is a factor fo $ax^2 + 2bx + c$

Answer: B::D



Watch Video Solution

13. if $\begin{vmatrix} \sin x & \sin y & \sin z \\ \cos x & \cos y & \cos z \\ \cos^3 x & \cos^3 y & \cos^3 z \end{vmatrix} = 0$ then which of the following is/are

possible ?

A. $x = y$

B. $y = z$

C. $x = z$

D. $x + y + z = \pi/2$

Answer: A::B::C::D



Watch Video Solution

14. If
$$\begin{vmatrix} x^2 + x & x + 1 & x - 2 \\ 2x^2 + 3x - 1 & 3x & 3x - 3 \\ x^2 + 2x + 3 & 2x - 1 & 2x - 1 \end{vmatrix} = xA + B$$
 then

A.
$$\begin{vmatrix} 1 & 1 & 1 \\ -1 & -3 & 3 \\ 4 & 0 & 0 \end{vmatrix}$$

B.
$$\begin{vmatrix} 0 & 1 & 2 \\ 1 & -2 & 3 \\ -4 & 0 & 0 \end{vmatrix}$$

C.
$$\begin{vmatrix} 1 & 1 & -2 \\ -3 & -2 & 3 \\ 4 & 0 & 1 \end{vmatrix}$$

D.
$$\begin{vmatrix} 0 & 1 & -2 \\ -1 & -3 & 3 \\ 4 & 0 & 0 \end{vmatrix}$$

Answer: A::D



Watch Video Solution

15. if $\begin{vmatrix} 1 & 1 & 1 \\ a & b & c \\ bc & ca & ab \end{vmatrix} = \begin{vmatrix} 1 & 1 & 1 \\ a & b & c \\ a^3 & b^3 & c^3 \end{vmatrix}$ where a,b,c are distinct

positive reals then the possible values of abc is/are

A. $\frac{1}{18}$

B. $\frac{1}{63}$

C. $\frac{1}{27}$

D. $\frac{1}{9}$

Answer: A:B

 [Watch Video Solution](#)

16. $\begin{vmatrix} {}^x C_r & {}^x C_{r+1} & {}^x C_{r+2} \\ {}^y C_r & {}^y C_{r+1} & {}^y C_{r+2} \\ {}^z C_r & {}^z C_{r+1} & {}^z C_{r+2} \end{vmatrix}$ is equal to

 [Watch Video Solution](#)

17. If $\begin{vmatrix} \sin\theta\cos\phi & \sin\theta\sin\phi & \cos\theta \\ \cos\theta\cos\phi & \cos\theta\sin\phi & -\sin\theta \\ -\sin\theta\sin\phi & \sin\theta\cos\phi & \theta \end{vmatrix}$ then

A. Δ is independent of theta

B. Δ is independent of ϕ

C. Δ is a constant

D. $\left[\frac{d\Delta}{d}(\theta) \right]_{\theta=\pi/2} = 0$

Answer: B::D

 [Watch Video Solution](#)

18. If $f(\theta) = \left| \sin^2 A \cot A \sin^2 B \cos B \sin^2 C \cos C \right|$, then $\tan A + \tan B + \cot A \cot B \cot C \sin^2 A + \sin^2 B + \sin^2 C$ 0

A. $\tan A + \tan B + C$

B. $\cot A \cot B \cot C$

C. $\sin^2 A + \sin^2 B + \sin^2 C$

D. 0

Answer: D

 [Watch Video Solution](#)

19. if determinant $\begin{vmatrix} \cos(\theta + \phi) & -\sin(\theta + \phi) & \cos 2\phi \\ \sin\theta & \cos\theta & \sin\phi \\ -\cos\theta & \sin\theta & \cos\phi \end{vmatrix}$ is

A. non-negative

B. independent of theta

C. independent of ϕ

D. none of these

Answer: A:B

 [Watch Video Solution](#)

20. If $g(x) = \begin{vmatrix} a^{-x} & e^{x \log_e a} & x^2 \\ a^{-3x} & e^{3x \log_e a} & x^4 \\ a^{-5x} & e^{5x \log_e a} & 1 \end{vmatrix}$ then

A. graphs of $g(x)$ is symmetrical about the origin

B. graphs of $g(x)$ is symmetrical about the y-axis

C. $\frac{d^4 g(x)}{dx^4} \Big|_{x=0} = 0$

D. $f(x) = g(x) \times \log. \left(\frac{a-x}{a+x} \right)$ is an odd function

Answer: A::C

 [Watch Video Solution](#)

21.

If

$$(x) = \left| x^2 + 4x - 32x + 4132x^2 + 5x - 94x + 5268x^2 - 6x + 116x - 6104 \right| = ax^3 + bx^2$$

then $a = 3$ b. $b = 0$ c. $c = 0$ d. none of these

A. $a = 3$

B. $b = 0$

C. $c = 0$

D. None of these

Answer: B::C

 [Watch Video Solution](#)

22. if
$$\begin{vmatrix} yz - x^2 & zx - y^2 & xy - z^2 \\ xz - y^2 & xy - z^2 & yz - x^2 \\ xy - z^2 & yz - x^2 & zx - y^2 \end{vmatrix} = \begin{vmatrix} r^2 & u^2 & u^2 \\ u^2 & r^2 & u^2 \\ u^2 & u^2 & r^2 \end{vmatrix}$$
 then

A. $r^2 = x + y + z$

B. $r^2 = x^2 = y^2 + z^2$

C. $u^2 = yz + zx + xy$

D. $u^2 = xyz$

Answer: B::C

 [Watch Video Solution](#)

23. which of the following is/are true for

$$\Delta = \begin{vmatrix} a^2 & 1 & a+c \\ 0 & b^2+1 & b+c \\ 0 & b+c & c^2+1 \end{vmatrix} ?$$

A. $\Delta \geq 0$ for real values of a,b,c

B. $\Delta \leq 0$ for real values of a,b,c

$$\text{C. } \Delta = \begin{vmatrix} bc-1 & 0 & 0 \\ 1 & ac & -a \\ -b & -a & ab \end{vmatrix}$$

D. $\Delta = 0$ if $bc = 1$ where a,b,c are non-zero

Answer: A::C::D

 [View Text Solution](#)

24. The values of $k \in R$ for which the system of equations $x + ky + 3z = 0$, $kx + 2y + 2z = 0$, $2x + 3y + 4z = 0$ admits of nontrivial solution is 2 b. $5/2$ c. 3 d. $5/4$

A. 2

B. $5/2$

C. 3

D. $5/4$

Answer: A::B



Watch Video Solution

25. The system of equations $-2x + y + z = a$ $x - 2y + z = b$ $x + y - 2z = c$ has

A. no solution if $a + b + c \neq 0$

B. unique solution if $a + b + c = 0$

C. infinite number of solutions if $a + b + c = 0$

D. None of these

Answer: A::C

 [Watch Video Solution](#)

26. Let α, β and γ be the roots of the equations $x^3 + ax^2 + bx + c = 0$, ($a \neq 0$). If the system of equations $\alpha x + \beta y + \gamma z = 0$, $\beta x + \gamma y + \alpha z = 0$ and $\gamma x + \alpha y + \beta z = 0$ has non-trivial solution then

A. $a^2 = 3b$

B. $a^3 = 27c$

C. $b^3 = 27c^2$

D. $\alpha + \beta + \gamma = 0$

Answer: A::B::C

 [Watch Video Solution](#)

Exercise Comprehension

1. Consider the function $f(x) = \begin{vmatrix} a^2 + x & ab & ac \\ ab & b^2 + x & bc \\ ac & bc & c^2 + x \end{vmatrix}$

Which of the following is true ?

- A. $f(x) = 0$ and $f(x) = 0$ have one positive common root
- B. $f(x) = 0$ and $f(x) = 0$ have one negative common root
- C. $f(x) = 0$ and $f(x) = 0$ have no common root
- D. None of these

Answer: D



[View Text Solution](#)

2. Consider the function $f(x) = \begin{vmatrix} a^2 + x & ab & ac \\ ab & b^2 + x & bc \\ ac & bc & c^2 + x \end{vmatrix}$

which of the following is true ?

- A. $f(x)$ has one +ve point of maxima.
- B. $f(x)$ has one -ve point of minima
- C. $f(x)=0$ has three distinct roots
- D. Local minimum value of $f(x)$ is zero

Answer: D



[View Text Solution](#)

3. Consider the function $f(x) = \begin{vmatrix} a^2 + x & ab & ac \\ ab & b^2 + x & bc \\ ac & bc & c^2 + x \end{vmatrix}$

In which of the following interval $f(x)$ is strictly increasing

A. $(-\infty, \infty)$

B. $(-\infty, 0)$

C. $(0, \infty)$

D. None of these

Answer: C

 [Watch Video Solution](#)

4. Let $\Delta = \begin{vmatrix} -bc & b^2 + bc & c^2 + bc \\ a^2 + ac & -ac & c^2 + ac \\ a^2 + ab & b^2 + ab & -ab \end{vmatrix}$ and the equation

$px^3 + qx^2 + rx + s = 0$ has roots a, b, c where $a, b, c \in \mathbb{R}^+$

the value of Δ is

A. r^2/p^2

B. r^3/p^3

C. $-s/p$

D. none of these

Answer: B

 [View Text Solution](#)

5. Let $\Delta = \begin{vmatrix} -bc & b^2 + bc & c^2 + bc \\ a^2 + ac & -ac & c^2 + ac \\ a^2 + ab & b^2 + ab & -ab \end{vmatrix}$ and the equation

$px^3 + qx^2 + rx + s = 0$ has roots a, b, c where $a, b, c \in \mathbb{R}^+$

The value of Δ is

A. $\leq 9r^2/p^2$

B. $\geq 27s^2/p^2$

C. $\leq 27s^3/p^3$

D. none of these

Answer: B

 [View Text Solution](#)

6. Let $\Delta = \begin{vmatrix} -bc & b^2 + bc & c^2 + bc \\ a^2 + ac & -ac & c^2 + ac \\ a^2 + ab & b^2 + ab & -ab \end{vmatrix}$ and the equation

$px^3 + qx^2 + rx + s = 0$ has roots a, b, c where $a, b, c \in \mathbb{R}^+$

if $\Delta = 27$ and $a^2 + b^2 + c^2 = 3$ then

A. $3p + 2q = 0$

B. $4p + 3q = 0$

C. $3p + q = 0$

D. none of these

Answer: C



Watch Video Solution

7. if $x > m, y > n, z > r (x, y, z > 0)$ such that
$$\begin{vmatrix} x & n & r \\ m & y & r \\ m & n & z \end{vmatrix} = 0$$

The value of $\frac{x}{x-m} + \frac{y}{y-n} + \frac{z}{z-r}$ is

A. 1

B. -1

C. 2

D. -2

Answer: C



Watch Video Solution

8. if $x > m, y > n, z > r (x, y, z > 0)$ such that
$$\begin{vmatrix} x & n & r \\ m & y & r \\ m & n & z \end{vmatrix} = 0$$

the value of $\frac{m}{x-m} + \frac{n}{y-n} + \frac{r}{z-r}$ is

A. -2

B. -4

C. 0

D. -1

Answer: D



Watch Video Solution

9. if $x > m, y > n, z > r (x, y, z > 0)$ such that
$$\begin{vmatrix} x & n & r \\ m & y & r \\ m & n & z \end{vmatrix} = 0$$

the value $\frac{xyz}{(x - m)(y - n)(z - r)}$ is

A. 27

B. $\frac{8}{27}$

C. $\frac{64}{27}$

D. None of these

Answer: B



Watch Video Solution

$$10. f(x) = \begin{vmatrix} x + c_1 & x + a & x + a \\ x + b & x + c_2 & x + a \\ x + b & x + b & x + c_3 \end{vmatrix} \text{ and } g(x) = (C_1 - x)(c_3 - x)$$

Coefficient of x in $f(x)$ is

A. $\frac{g(a) - f(b)}{b - a}$

B. $\frac{g(-a) - g(-b)}{b - a}$

C. $\frac{g(a) - g(b)}{b - a}$

D. none of these

Answer: C



View Text Solution

$$11. f(x) = \begin{vmatrix} x + c_1 & x + a & x + a \\ x + b & x + c_2 & x + a \\ x + b & x + b & x + c_3 \end{vmatrix} \text{ and } g(x) = (C_1 - x)(c_3 - x)$$

Which of the following is not a constant term in $f(x)$?

A. $\frac{bg(a) - ag(b)}{(b - a)}$

B. $\frac{bf(a) - af(-b)}{(b - a)}$

C. $\frac{bf(-a) - ag(b)}{(b - a)}$

D. none of these

Answer: D

 [View Text Solution](#)

$$12. f(x) = \begin{vmatrix} x + c_1 & x + a & x + a \\ x + b & x + c_2 & x + a \\ x + b & x + b & x + c_3 \end{vmatrix} \text{ and } g(x) = (C_1 - x)(c_3 - x)$$

Which of the following is not true ?

A. $f(-a) = g(a)$

B. $f(-a) = g(-a)$

C. $f(-b) = g(b)$

D. none of these

Answer: B

 [View Text Solution](#)

13. Suppose $f(x)$ is a function satisfying the following conditions :

(i) $f(0)=2, f(1)=1$

(ii) f has a minimum value at $x = 5/2$

(iii) for all x , $f(x) = \begin{vmatrix} 2ax & 2ax - 1 & 2ax + b + 1 \\ b & b + 1 & -1 \\ 2(ax + b) & 2ax + 2b + 1 & 2ax + b \end{vmatrix}$

The value of $f(2)$ is

A. $1/4$

B. $1/2$

C. -1

D. 3

Answer: B



Watch Video Solution

14. Suppose $f(x)$ is a function satisfying the following conditions :

(i) $f(0)=2, f(1)=1$

(ii) f has a minimum value at $x = 5/2$

(iii) for all x , $f(x) = \begin{vmatrix} 2ax & 2ax - 1 & 2ax + b + 1 \\ b & b + 1 & -1 \\ 2(ax + b) & 2ax + 2b + 1 & 2ax + b \end{vmatrix}$

$f(x)=0$ has

A. both roots positive

B. both roots negative

C. roots of opposite sign

D. imaginary roots

Answer: D



[View Text Solution](#)

15. Suppose $f(x)$ is a function satisfying the following conditions :

(i) $f(0)=2, f(1)=1$

(ii) f has a minimum value at $x = 5/2$

(iii) for all x , $f(x) = \begin{vmatrix} 2ax & 2ax - 1 & 2ax + b + 1 \\ b & b + 1 & -1 \\ 2(ax + b) & 2ax + 2b + 1 & 2ax + b \end{vmatrix}$

Range of $f(x)$ is

A. $[7/16, \infty)$

B. $(-\infty, 15/16]$

C. $[3/4, \infty)$

D. none of these

Answer: A



[View Text Solution](#)

16. Consider the polynomial function

$$f(x) = \begin{vmatrix} (1+x)^a & (1+2x)^b & 1 \\ 1 & (1+x)^a & (1+2x)^b \\ (1+2x)^b & 1 & (1+x)^a \end{vmatrix} \quad a, b \text{ being positive integers. The}$$

constant term in $f(x)$ is

- A. 2
- B. 1
- C. -1
- D. 0

Answer: D



Watch Video Solution

17. Consider the polynomial function

$$f(x) = \begin{vmatrix} (1+x)^2 & (1+2x)^b & 1 \\ 1 & (1+x)^a & (1+2x)^b \\ (1+2x)^b & 1 & (1+x)^a \end{vmatrix}$$

a, b being positive integers.

the coefficient of x in f(x) is

A. 2^a

B. $2^a - 3 \times 2^b + 1$

C. 0

D. none of these

Answer: C



[Watch Video Solution](#)

18. Consider the polynomial function

$$f(x) = \begin{vmatrix} (1+x)^2 & (1+2x)^b & 1 \\ 1 & (1+x)^a & (1+2x)^b \\ (1+2x)^b & 1 & (1+x)^a \end{vmatrix}$$

a,b being positive integers.

Which of the following is true ?

- A. All the roots of the equation $f(x)=0$ are positive
- B. All the roots of the equation $f(x)=0$ are negative
- C. At least one of the equation $f(x)=0$ is repeating one .
- D. None of these

Answer: C



[View Text Solution](#)

19. Given that the system of equations $x = cy + bz, y = az + cx, z = bx + ay$ has nonzero solutions and and at least one of the a,b,c is a proper

fraction.

$a^2 + b^2 + c^2$ is

A. > 2

B. > 3

C. < 3

D. < 2

Answer: C



[View Text Solution](#)

20. Given that the system of equations $x = cy + bz, y = az + cx, z = bx + ay$ has nonzero solutions and at least one of the a, b, c is a proper fraction.

abc is

A. > -1

B. > 1

C. < 2

D. < 3

Answer: A



[View Text Solution](#)

21. Given that the system of equations $x = cy + bz, y = az + cx, z = bx + ay$ has nonzero solutions and at least one of the a, b, c is a proper fraction.

System has solution such that

A. $x, y, z \equiv (1 - 2a^2) : (1 - 2b^2) : (1 - 2c^2)$

B. $x, y, z \equiv \frac{1}{1 - 2a^2} : \frac{1}{1 - 2b^2} : \frac{1}{1 - 2c^2}$

C. $x, y, z \equiv \frac{a}{1 - a^2} : \frac{b}{1 - b^2} : \frac{c}{1 - c^2}$

D. $x, y, z \equiv \sqrt{1 - a^2} : \sqrt{1 - b^2} : \sqrt{1 - c^2}$

Answer: D



[View Text Solution](#)

22. Consider the system of equations

$$x + y + z = 6$$

$$x + 2y + 3z = 10$$

$$x + 2y + \lambda z = \mu$$

the system has unique solution if

A. $\lambda \neq 3$

B. $\lambda = 3, \mu = 10$

C. $\lambda = 3, \mu \neq 10$

D. none of these

Answer: A



[Watch Video Solution](#)

23. Consider the system of equations

$$x + y + z = 6$$

$$x + 2y + 3z = 10$$

$$x + 2y + \lambda z = \mu$$

the system has infinite solutions if

A. $\lambda \neq 3$

B. $\lambda = 3, \mu = 10$

C. $\lambda = 3, \mu \neq 10$

D. $\lambda = 3, \mu \neq 10$

Answer: B



[Watch Video Solution](#)

24. Consider the system of equations

$$x + y + z = 6$$

$$x + 2y + 3z = 10$$

$$x + 2y + \lambda z = \mu$$

The system has no solution if

- A. $\lambda \neq 3$
- B. $\lambda = 3, \mu = 10$
- C. $\lambda = 3, \mu \neq 10$
- D. none of these

Answer: C



[Watch Video Solution](#)

Matrix Match Type

1. Match the following lists :



[View Text Solution](#)

2. Match the following lists:



[View Text Solution](#)

3. If α, β, γ are the roots of $x^3 - 3x^2 + 3x - 1 = 0$ then match the list I with list II

$$\begin{array}{l} \text{List I: } \alpha, \beta, \gamma \\ \text{List II: } 1^2, 2^2, 3^2, 4^2, 5^2 \end{array}$$

then match the list I with list II



[View Text Solution](#)

4. consider the system of equations

$$\lambda x + y + z = 1$$

$$x + \lambda y + z = \lambda$$

$$x + y + \lambda z = \lambda^2$$

Now match the following lists:



[View Text Solution](#)

5. consider determinant $\Delta = \begin{vmatrix} a_{ij} \end{vmatrix}$ of order 3. If $\Delta = 2$ then match the following lists.



[View Text Solution](#)

Exercise Numerical

1. If $a_1, a_2, a_3, 54, a_6, a_7, a_8, a_9$ are in H.P., and $D = \begin{vmatrix} a_1 a_2 a_3 54 a_6 a_7 a_8 a_9 \end{vmatrix}$, then the value of $[D]$ is where $[.]$ represents the greatest integer function



[Watch Video Solution](#)

2. the sum of values of p for which the equations $x+y+z=1x+2y+4z=p$ and $x+4y+10z=p^2$ have a solution is _____

 [Watch Video Solution](#)

3. The sum of roots of the equations

$$\begin{vmatrix} x+2 & 2x+3 & 3x+4 \\ 2x+3 & 3x+4 & 4x+5 \\ 3x+5 & 5x+8 & 10x+17 \end{vmatrix} = 0 \text{ is } \underline{\hspace{2cm}}$$

 [Watch Video Solution](#)

4. Prove that

$$\begin{vmatrix} (\beta + \gamma - \alpha - \delta)^4 & (\beta + \gamma - \alpha - \delta)^2 & 1 \\ (\gamma + \alpha - \beta - \delta)^4 & (\gamma + \alpha - \beta - \delta)^2 & 1 \\ (\alpha + \beta - \gamma - \delta)^4 & (\alpha + \beta - \gamma - \delta)^2 & 1 \end{vmatrix} = -64(\alpha - \beta)(\alpha - \gamma)(\alpha - \delta)(\beta - \delta)(\gamma - \delta)$$

 [Watch Video Solution](#)

5. If $f(x) = \begin{vmatrix} 1 & x & x+1 \\ 2x & x(x-1) & (x+1)x \\ 3x(x-1) & x(x-1)(x-2) & (x+1)x(x-1) \end{vmatrix}$ then the value of

$f(500)$ _____



[Watch Video Solution](#)

6.

if

$$|(x, x+y, x+y+z), (2x+3x+2y, 4x+3y+2z), (3x+6x+3y, 10x+6y+3z)| = 6$$

then the real value of x is



[Watch Video Solution](#)

7. Let $D_1 = |aba + bc dc + daba - b|$ and $D_2 = |aca + cbdb + daca + b + c|$ then

the value of $\left| \frac{D_1}{D_2} \right|$, where $b \neq 0$ and $d \neq bc$, is _____.



[Watch Video Solution](#)

8. if $a_1, a_2, a_3, \dots, a_{12}$ are in A.P and

$$\Delta_1 = \begin{vmatrix} a_1 a_5 & a_1 & a_2 \\ a_2 a_6 & a_2 & a_3 \\ a_3 a_7 & a_3 & a_4 \end{vmatrix} \quad \Delta_3 = \begin{vmatrix} a_2 b_{10} & a_2 & a_3 \\ a_3 a_{11} & a_3 & a_4 \\ a_3 a_{12} & a_4 & a_5 \end{vmatrix}$$

then $\Delta_1 : \Delta_2 =$ _____

 [Watch Video Solution](#)

9. if $(1 + ax + bx^2)^4 = a_0 + a_1x + a_2x^2 + \dots + a_8x^8$, where $a, b, a_0, a_1, \dots, a_8 \in R$ such that $a_0 + a_1 + a_2 \neq 0$ and

$$\begin{vmatrix} a_0 & a_1 & a_2 \\ a_1 & a_2 & a_0 \\ a_2 & a_0 & a_1 \end{vmatrix} = 0 \text{ then the value of } 5 \cdot \frac{a}{b} \text{ is } \underline{\hspace{2cm}}$$

 [Watch Video Solution](#)

10. $\begin{vmatrix} 5\sqrt{\log_e 3} & 5\sqrt{\log_e 3} & 3\sqrt{\log_e 3} \\ 3^{-\log_{1/3} 4} & (0.1)^{\log_{0.01} 4} & 7^{\log_7 3} \\ 7 & 3 & 5 \end{vmatrix}$ is equal to _____



Watch Video Solution

11. Let $a+b+c = s$ and $\begin{vmatrix} s+c & a & b \\ c & s+a & b \\ c & a & s+b \end{vmatrix} = 532$ then the value of s is



Watch Video Solution

12. Let $a, b, c, \in R$ not all are equal and $\Delta_1 = \begin{vmatrix} a & b & c \\ b & c & a \\ c & a & b \end{vmatrix}$

$\Delta_2 = \begin{vmatrix} a+2b & b+3c & c+4a \\ b+2c & c+3a & a+4b \\ c+2a & a+3b & b+4c \end{vmatrix}$ then $\frac{\Delta_2}{\Delta_1} = \underline{\hspace{2cm}}$



Watch Video Solution

13. Three distinct points $P(3u^2, 2u^3)$; $Q(3v^2, 2v^3)$ and $R(3w^2, 2w^3)$ are collinear then

 [Watch Video Solution](#)

14. if $\Delta_r = \begin{vmatrix} r & 612 & 915 \\ 101r^2 & 2r & 3r \\ r & \frac{1}{r} & \frac{1}{r^2} \end{vmatrix}$ then the value of

$\lim_{n \rightarrow \infty} \frac{1}{n^3} \left(\sum_{r=1}^n \Delta_r \right)$ is _____

 [Watch Video Solution](#)

15. if $x=31, y=32$ and $z=33$ then the value of

$\begin{vmatrix} (x^2 + 1)^2 & (xy + 1)^2 & (xz + 1)^2 \\ (xy + 1)^2 & (y^2 + 1)^2 & (yz + 1)^2 \\ (xz + 1)^2 & (yz + 1)^2 & (z^2 + 1)^2 \end{vmatrix}$ is _____



[Watch Video Solution](#)



Watch Video Solution

16. Let α, β, γ are the real roots of the equation $x^3 + ax^2 + bx + c = 0$ ($a, b, c \in \mathbb{R}$ and $a \neq 0$). If the system of equations (u, v, w) given by $\alpha u + \beta v + \gamma w = 0$, $\beta u + \gamma v + \alpha w = 0$, $\gamma u + \alpha v + \beta w = 0$ has non-trivial solutions then the value of a^2/b is _____.



Watch Video Solution

17. The value of $|\alpha|$ for which the system of equation

$$\alpha x + y + z = \alpha - 1$$

$$x + \alpha y + z = \alpha - 1$$

$$x + y + \alpha z = \alpha - 1$$

has no solution, is _____



Watch Video Solution

18. Number of values of θ lying in $[0, 100\pi]$ for which the system of equations $(\sin 3\theta) x - y + z = 0$, $(\cos 2\theta) x + 4y + 3z = 0$, $2x + 7y + 7z = 0$ has non-trivial solution is _____



Watch Video Solution

Jee Main Previous Year

1. Let a, b, c be such that $b(a+c) \neq 0$. If

$$\begin{vmatrix} a & a+1 & a-1 \\ -b & b+1 & b-1 \\ c & c-1 & c+1 \end{vmatrix} + \begin{vmatrix} a+1 & b+1 & c-1 \\ a-1 & b-1 & c+1 \\ (-1)^{n+2}a & (-1)^{n+1}b & (-1)^n c \end{vmatrix} = 0, \text{ Then the}$$

value of 'n' is:

- A. zero
- B. any even integer
- C. any odd integer
- D. any integer

Answer: 3



[Watch Video Solution](#)

2. Consider the system of linear equations:

$$x_1 + 2x_2 + x_3 = 3$$

$$2x_1 + 3x_2 + x_3 = 3$$

$$3x_1 + 5x_2 + 2x_3 = 1$$

The system has

- A. no solution
- B. infinite number of solutions
- C. exactly three solutions.
- D. a unique solution

Answer: 1



[Watch Video Solution](#)

3. The number of values of k for which the linear equations $4x + ky + 2z = 0$, $kx + 4y + z = 0$, $2x + 2y + z = 0$ possess a non-zero solution is : (1) 3 (2) 2 (3) 1 (4) zero

A. zero

B. 3

C. 2

D. 1

Answer: 3



[Watch Video Solution](#)

4. The number of values of k for which the system of equations:

$$kx + (3k + 2)y = 4k$$

$$(3k - 1)x + (9k + 1)y = 4(k + 1)$$
 has no solution, are

A. infinite

B. 1

C. 2

D. 3

Answer: 2



Watch Video Solution

5. If $\alpha, \beta \neq 0$, and $f(n) = \alpha^n + \beta^n$ and

$$|31 + f(1)1 + f(2)1 + f(1)1 + f(2)1 + f(3)1 + f(2)1 + f(3)1 + f(4)| = K(1 - \alpha)^2(1 - \beta)^2$$

, then K is equal to (1) $\alpha\beta$ (2) $\frac{1}{\alpha\beta}$ (3) 1 (4) -1

A. $\alpha\beta$

B. $\frac{1}{\alpha\beta}$

C. 1

D. -1

Answer: 3



Watch Video Solution

6. The set of the all values of λ for which the system of linear equations

$$2x_1 - 2x_2 + x_3 = \lambda x_1$$

$$2x_1 - 3x_2 + 2x_3 = \lambda x_2$$

$$-x_1 + 2x_2 = \lambda x_3$$
 has a non-trivial solution,

- A. is an empty set
- B. is a singleton set
- C. contains two elements
- D. contains more than two elements

Answer: 3



Watch Video Solution

7. The system of linear equations $x + \lambda y - z = 0$ $\lambda x - y - z = 0$ $x + y - \lambda z = 0$

has a non-trivial solution for : (1) infinitely many values of λ . (2) exactly

one value of λ . (3) exactly two values of λ . (4) exactly three values of λ .

- A. Exactly one value of λ
- B. Exactly two values of λ
- C. Exactly three values of λ
- D. Infinitely many values of λ

Answer: 3



[Watch Video Solution](#)

8. If S is the set of distinct values of ' b ' for which the following system of linear equations $x + y + z = 1$ $x + ay + z = 1$ $ax + by + z = 0$ has no solution, then S is : a finite set containing two or more elements (2) a singleton an empty set (4) an infinite set

- A. a singleton set
- B. an empty set
- C. an infinite set

D. a finite set containing two or more elements

Answer: 1

 [Watch Video Solution](#)

9. Let ω be a complex number such that $2\omega + 1 = z$ where $z = \sqrt{-3}$.

If $\left| 1111 - \omega^2 - 1\omega^2 1\omega^2 \omega^7 \right| = 3k$, then k is equal to : -1 (2) 1 (3) $-z$ (4) z

A. 1

B. $-z$

C. z

D. -1

Answer: 2

 [Watch Video Solution](#)

10. If the system of linear equations $x+ky+3z=0$ $3x+ky-2z=0$ $2x+4y-3z=0$ has a non-zero solution (x,y,z) then $\frac{xz}{y^2}$ is equal to

A. 30

B. -10

C. 10

D. -30

Answer: 3



[Watch Video Solution](#)

11. If $\begin{vmatrix} x-4 & 2x & 2x \\ 2x & x-4 & 2x \\ 2x & 2x & x-4 \end{vmatrix} = (A+Bx)(x-A)^2$ then the ordered pair (A,B) is

equal to

A. (4, 5)

B. (-4, -5)

C. (-4, 3)

D. (-4, 5)

Answer: D



Watch Video Solution

Jee Advanced Previous Year

1. Which of the following values of α satisfying the equation

$$\left| (1 + \alpha)^2(1 + 2\alpha)^2(1 + 3\alpha)^2(2 + \alpha)^2(2 + 2\alpha)^2(2 + 3\alpha)^2(3 + \alpha)^2(3 + 2\alpha)^2(3 + 3\alpha)^2 \right|$$

-4 b. 9 c. -9 d. 4

A. -4

B. 9

C. -9

D. 4

Answer: 2,3

 [Watch Video Solution](#)

2. Let $a, \lambda, \mu \in \mathbb{R}$, Consider the system of linear equations $ax + 2y = \lambda 3x - 2y = \mu$ Which of the following statement (s) is (are) correct?

- A. If $\alpha = -3$ then the system has infinitely many solutions for all values of λ and μ
- B. If $\alpha \neq -3$ then the system has a unique solution for all values of λ and μ
- C. If $\lambda + \mu = 0$ then the system has infinitely many solutions for $\alpha = -3$
- D. if $\lambda + \mu \neq 0$ then the system has no solution for $\alpha = -3$

Answer: 2,3,4

 [Watch Video Solution](#)

3. Let ω be the complex number $\cos\left(\frac{2\pi}{3}\right) + i\sin\left(\frac{2\pi}{3}\right)$. Then the number of

distinct complex cos numbers z satisfying $\Delta = \begin{vmatrix} z+1 & \omega & \omega^2 \\ \omega & z+\omega^2 & 1 \\ \omega^2 & 1 & z+\omega \end{vmatrix} = 0$

is

 [Watch Video Solution](#)

4. The total number of distinct $x \in R$ for which $\begin{vmatrix} x & x^2 & 1+x^3 \\ 2x & 4x^2 & 1+8x^3 \\ 3x & 9x^2 & 1+27x^3 \end{vmatrix} = 10$

is (A) 0 (B) 1 (C) 2 (D) 3

 [Watch Video Solution](#)

5. For a real number α , if the system $\begin{bmatrix} 1 & \alpha & \alpha^2 \\ \alpha & 1 & \alpha \\ \alpha^2 & \alpha & 1 \end{bmatrix} [xyz] = [1 \ -11]$ of linear equations, has infinitely many solutions, then $1 + \alpha + \alpha^2 =$



[Watch Video Solution](#)

[Watch Video Solution](#)

6. Let P be a matrix of order 3×3 such that all the entries in P are from the set $\{-1, 0, 1\}$. Then, the maximum possible value of the determinant of P is _____.

[Watch Video Solution](#)

Solved Examples And Exercises

1. If $f(\theta) = \begin{vmatrix} \sin^2 A & \cot A & 1 \\ \sin^2 B & \cos B & 1 \\ \sin^2 C & \cos C & 1 \end{vmatrix}$, then (a) $\tan A + \tan B + \tan C$ (b) $\cot A \cot B \cot C$ (c) $\sin^2 A + \sin^2 B + \sin^2 C$ (d) 0

[Watch Video Solution](#)

2. Let $\Delta(x) = \begin{vmatrix} 3 & 3x & 3x^2 + 2a^2 \\ 3x & 3x^2 + 2a^2 & 3x^3 + 6a^2x \\ 3x^2 + 2a^2 & 3x^3 + 6a^2x & 3x^4 + 12a^2x^2 + 2a^4 \end{vmatrix}$ then

 [Watch Video Solution](#)

3. The determinant $\Delta = \begin{vmatrix} a^2 + x & ab & ca \\ ab & a^2 + x & bc \\ ca & bc & a^2 + x \end{vmatrix}$ is divisible by x b. x^2 c. x^3 d. none of these

 [Watch Video Solution](#)

4. If $f(x) = \begin{vmatrix} a & -1 & 0 \\ ax & a & -1 \\ ax^2 & ax & a \end{vmatrix}$, then $f(2x) - f(x)$ is divisible by (a) a (b) b (c) c, d, e

(d) none of these

 [Watch Video Solution](#)

5.

If

$$(x) = \left| x^2 + 4x - 32x + 4132x^2 + 5x - 94x + 5268x^2 - 6x + 116x - 6104 \right| = ax^3 + bx^2$$

then $a = 3$ b. $b = 0$ c. $c = 0$ d. none of these



Watch Video Solution

6. If $\left| x^n x^{n+2} x^{2n} 1x^a ax^{n+5} x^{a+6} x^{2n+5} \right| = 0, \forall x \in R, \text{ when } n \in N$, then value of a is n b. $n - 1$ c. $n + 1$ d. none of these



Watch Video Solution

7. Let $x < 1$, then value of $\begin{bmatrix} x^2 + 2 & 2x + 1 & 1 \\ 2x + 1 & x + 2 & 1 \\ 3 & 3 & 1 \end{bmatrix}$ is a. none-negative b.

none-positive c. negative d. positive



Watch Video Solution

8. Find the number of real root of the equation

$$\begin{vmatrix} 0 & x-a & x-b \\ x+a & 0 & x-c \\ x+b & x+c & 0 \end{vmatrix} = 0, a \neq b \neq c \text{ and } b(a+c) > ac$$

 [Watch Video Solution](#)

9. Value of $\begin{bmatrix} x+y & z & z \\ x & y+z & x \\ y & y & z+x \end{bmatrix}$, where x, y, z are nonzero real number, is equal to xyz b. $2xyz$ c. $3xyz$ d. $4xyz$

 [Watch Video Solution](#)

10. If $e^{i\theta} = \cos\theta + i\sin\theta$, find the value of

$$\left| 1e^{i\pi/3} e^{i\pi/4} e^{-i\pi/3} 1e^{i2\pi/3} e^{-i\pi/4} e^{-i2\pi/3} 1 \right|$$

 [Watch Video Solution](#)

11. Which of the following is not the root of the equation

$$\begin{vmatrix} x & -6 & -1 \\ 2 & -3x & x-3 \\ -3 & 2x & x+2 \end{vmatrix} = 0? \text{ a. } 2 \text{ b. } 0 \text{ c. } 1 \text{ d. } -3$$



Watch Video Solution

12. If A, B, C are the angles of a non right angled triangle ABC. Then find the

value of:
$$\begin{vmatrix} \tan A & 1 & 1 \\ 1 & \tan B & 1 \\ 1 & 1 & \tan C \end{vmatrix}$$



Watch Video Solution

13. If $f(x) = |xaxaxaaax| = 0$, then $f'(x) = 0$ and $f^x = 0$ has common root $f^x = 0$ and $f'(x) = 0$ has common root sum of roots of $f(x) = 0$ is $-3a$ none of these



Watch Video Solution

14.
$$\begin{vmatrix} \cos\alpha\cos\beta & \cos\alpha\sin\beta & -\sin\alpha \\ -\sin\beta & \cos\beta & 0 \\ \sin\alpha\cos\beta & \sin\alpha\sin\beta & \cos\alpha \end{vmatrix}$$

 [Watch Video Solution](#)

15. Roots of the equation $|xmn1axn1abx1abc1| = 0$ are independent of m , and n independent of a, b , and c depend on m, n , and a, b, c independent of m, n and a, b, c

 [Watch Video Solution](#)

16. Prove that the value of each the following determinants is zero:

$$|a \quad - \quad - \quad ax - yy - zz - xp - qq - rr - p|$$

 [Watch Video Solution](#)

17. If a, b, c are different, then the value of

$$\begin{vmatrix} 0 & x^2 & -ax^3 & -bx^2 & +a0x^2 & +cx^4 & +bx & -c0 \end{vmatrix} = 0$$

 [Watch Video Solution](#)

18. Prove that the value of each the following determinants is zero:

$$\begin{vmatrix} a_1 & la_1 + mb_1 & b_1 \\ a_2 & la_2 + mb_2 & b_2 \\ a_3 & la_3 + mb_3 & b_3 \end{vmatrix}$$

 [Watch Video Solution](#)

19. If $|b + + aa + ba + + + ac + aa + + c| = k|abaca|$, then value of k is 1 b.

2 c. 3 d. 4

 [Watch Video Solution](#)

20. A triangle has vertices $A_i(x_i, y_i)$ for $i = 1, 2, 3$. If the orthocentre of the triangle is $(0, 0)$, then prove that

$$x_2 - x_3 y_2 - y_3 y_1 (y_2 - y_3) + x_1 (x_2 - x_3) x_3 - x_1 y_2 - y_3 y_2 (y_3 - y_1) + x_1 (x_3 - x_1) x_1$$

 [Watch Video Solution](#)

21. If α, β, γ are the roots of $ax^3 + bx^2 + cx + d = 0$ and $|\alpha\beta\gamma\beta\gamma\alpha\gamma\alpha\beta| = 0$, $\alpha \neq \beta \neq \gamma$ then find the equation whose roots are $\alpha + \beta - \gamma, \beta + \gamma - \alpha$, and $\gamma + \alpha - \beta$.

 [Watch Video Solution](#)

22. If $\Delta = \begin{vmatrix} a_1 & b_1 & c_1 \\ a_2 & b_2 & c_2 \\ a_3 & b_3 & c_3 \end{vmatrix}$ and $\Delta_1 = \begin{vmatrix} a_1 + pb_1 & b_1 + qc_1 & c_1 + ra_1 \\ a_2 + pb_2 & b_2 + qc_2 & c_2 + ra_2 \\ a_3 + pb_3 & b_3 + qc_3 & c_3 + ra_3 \end{vmatrix}$ then

$\Delta_1 =$

 [Watch Video Solution](#)

23. Prove that the value of each the following determinants is zero:

$$\begin{vmatrix} (a^x + a^{-x})^2 & (a^x - a^{-x})^2 & 1 \\ (b^y + b^{-y})^2 & (b^y - b^{-y})^2 & 1 \\ (c^z + c^{-z})^2 & (c^z - c^{-z})^2 & 1 \end{vmatrix}$$

 [Watch Video Solution](#)

24. The value of the determinant $\begin{bmatrix} 1^2 & 2^2 & 3^2 & 4^2 \\ 2^2 & 3^2 & 4^2 & 5^2 \\ 3^2 & 4^2 & 5^2 & 6^2 \\ 4^2 & 5^2 & 6^2 & 7^2 \end{bmatrix}$ is equal to 1 b. 0 c. 2

d. 3

 [Watch Video Solution](#)

25. If $f(x) = |1 \times + 12 \times (x - 1)(x + 1)x3x(x - 1)x(x - 1)(x - 2)(x + 1)x(x - 1)|$

then $f(5000)$ is equal to 0 b. 1 c. 500 d. -500



Watch Video Solution

26. Prove that the value of each the following determinants is zero:

$$|\log x \log y \log z \log 2x \log 2y \log 2z \log 3x \log 3y \log 3z|$$



Watch Video Solution

27. If the system of equations $x - ky - z = 0$, $kx - y - z = 0$, $x + y - z = 0$ has a nonzero solution, then the possible value of k are -1, 2 b. 1, 2 c. 0, 1 d.

-1, 1



Watch Video Solution

28. Show that

$$\begin{vmatrix} 1 & 1+p & 1+p+q \\ 2 & 3+2p & 1+3p+2q \\ 3 & 6+3p & 1+6p+3q \end{vmatrix} =$$



Watch Video Solution

29. The determinant $\begin{vmatrix} a & b & c \\ a\alpha + c & b\alpha + c & c\alpha + c \\ \alpha + c & \alpha + c & \alpha + c \end{vmatrix} = 0$, if a, b, c are in A.P. a, b, c are in G.P. a, b, c are in H.P. α is a root of the equation $ax^2 + bx + c = 0$ $(x - \alpha)$ is a factor of $ax^2 + 2bx + c$

 [Watch Video Solution](#)

30. By using properties of determinants. Show that:

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

 [Watch Video Solution](#)

31. Which of the following values of α satisfying the equation

$$\begin{vmatrix} (1 + \alpha)^2 & (1 + 2\alpha)^2 & (1 + 3\alpha)^2 & (2 + \alpha)^2 & (2 + 2\alpha)^2 & (2 + 3\alpha)^2 & (3 + \alpha)^2 & (3 + 2\alpha)^2 & (3 + 3\alpha)^2 \\ -4 & b & 9 & c & -9 & d & 4 & & \end{vmatrix}$$

 [Watch Video Solution](#)

32.

Show

that:

$$|3a - a + b - a + c - b + a3b - b + c - c + a - c + b3c| = 3(a + b + c)(ab + bc + ca)$$



Watch Video Solution

33. If the system of equations $x + ay = 0$, $az + y = 0$, and $ax + z = 0$ has infinite solutions, then the value of equation has no solution is -3 b. 1 c. 0 d. 3



Watch Video Solution

34. If $|6i - 3i143i - 1203i| = x + iy$, then a. $x = 3, y = 1$ b. $x = 1, y = 3$ c. $x = 0, y = 3$ d. $x = 0, y = 0$



Watch Video Solution

35. The value of $\begin{vmatrix} yz & zx & xy \\ p & 2p & 3r \\ 1 & 1 & 1 \end{vmatrix}$, where x, y, z are respectively, p th, $(2q)$ th, and

$(3r)$ th terms of an H.P. is a. -1 b. 0 c. 1 d. none of these

 [Watch Video Solution](#)

36. Prove that

$$\begin{vmatrix} (\beta + \gamma - \alpha - \delta)^4 & (\beta + \gamma - \alpha - \delta)^2 & 1 \\ (\gamma + \alpha - \beta - \delta)^4 & (\gamma + \alpha - \beta - \delta)^2 & 1 \\ (\alpha + \beta - \gamma - \delta)^4 & (\alpha + \beta - \gamma - \delta)^2 & 1 \end{vmatrix} = -64(\alpha - \beta)(\alpha - \gamma)(\alpha - \delta)(\beta - \delta)(\gamma - \delta)$$

 [Watch Video Solution](#)

37. Prove that the value of each the following determinants is zero:

$$\begin{vmatrix} \sin^2\left(x + \frac{3\pi}{2}\right) & \sin^2\left(x + \frac{5\pi}{2}\right) & \sin^2\left(x + \frac{7\pi}{2}\right) \\ \sin^{x + \frac{3\pi}{2}} & \sin^{x + \frac{5\pi}{2}} & \sin^{x + \frac{7\pi}{2}} \\ \sin^{x - \frac{3\pi}{2}} & \sin^{x - \frac{5\pi}{2}} & \sin^{x - \frac{7\pi}{2}} \end{vmatrix}$$

 [Watch Video Solution](#)

38. The number of values of k for which the system of the equations $(k + 1)x + 8y = 4k$ and $kx + (k + 3)y = 3k - 1$ has infinitely many solutions is 0
b. 1 c. 2 d. infinite



Watch Video Solution

39. Prove that $|b + ca - bac + ab - cba + bc - ac| = 3ab - a^3 - b^3 - c^3$



Watch Video Solution

40. If

$$\left| a^2 b^2 c^2 (a + 1)^2 (b + 1)^2 (c + 1)^2 (a - 1)^2 (b - 1)^2 (c - 1)^2 \right| = k(a - b)(b - c)(c - a),$$

then find the value of k



Watch Video Solution

41.

Statement

1:

$$\Delta = |my + nzmq + nrmb + nckz - mxkr - mpkc - ma - nx - ky - np - kq - na - kb|$$

is equal to 0. Statement 2: The value of skew symmetric matrix of order 3 is zero.

 Watch Video Solution

42. Prove that
$$|111abc| + a^2ac + b^2ab + c^2 = 2(a-b)(b-c)(c-a)$$

 Watch Video Solution

43.

If

$$= |s \int h \eta \cos \phi \sin \theta \in \varphi \cos \theta \cos \theta \cos \phi \cos \theta \in \varphi - s \int h \eta - s \int h \eta \in \varphi s \int h \eta \cos \phi|$$

then is independent of θ is independent of ϕ Δ is a constant

$$\left(\frac{d\Delta}{d\theta} \right)_{\theta=\pi/2} = 0$$

 Watch Video Solution

44. The system of equations $-2x + y + z = a$, $x - 2y + z = b$, $x + y - 2z = c$, has: (a) no solution if $a + b + c \neq 0$ (b) unique solution if $a + b + c = 0$ (c) infinite number of solutions if $a + b + c = 0$ (d) none of these

 Watch Video Solution

45. Show that if $x_1, x_2, x_3 \neq 0$

$$\begin{vmatrix} x_1 + a_1 b_1 & a_1 b_2 & a_1 b_3 \\ a_2 b_1 & x_2 + a_2 b_2 & a_2 b_3 \\ a_3 b_1 & a_3 b_2 & x_3 + a_3 b_3 \end{vmatrix} = x_1 x_2 x_3 \left(1 + \frac{a_1 b_1}{x_1} + \frac{a_2 b_2}{x_2} + \frac{a_3 b_3}{x_3} \right)$$

 Watch Video Solution

46. If determinant

$$\begin{vmatrix} \cos(\theta + \varphi) & -\sin(\theta + \varphi) \\ \cos 2\varphi & \sin 2\varphi \\ \cos \theta & \sin \theta \end{vmatrix} \in \varphi - \cos \theta \sin \varphi$$

is a. positive b. independent of q c. independent of φ d. none of these

 Watch Video Solution

47. If $\Delta_r = \begin{vmatrix} 2^{r-1} & 2 \cdot 3^{r-1} & 4 \cdot 5^{r-1} \\ \alpha & \beta & \gamma \\ 2^n - 1 & 3^n - 1 & 5^n - 1 \end{vmatrix}$, then find the value of Δ

 [Watch Video Solution](#)

48. The values of $k \in R$ for which the system of equations $x + ky + 3z = 0$, $kx + 2y + 2z = 0$, $2x + 3y + 4z = 0$ admits of nontrivial solution is 2 b. $5/2$ c. 3 d. $5/4$

 [Watch Video Solution](#)

49. A determinant of second order is made with the elements 0 and 1. Find the number of determinants with non-negative values.

 [Watch Video Solution](#)

50. If a, b, c are nonzero real numbers such that $|baabcaacaa| = 0$, then

$\frac{1}{a} + \frac{1}{b\omega} + \frac{1}{c\omega^2} = 0$ b. $\frac{1}{a} + \frac{1}{b\omega^2} + \frac{1}{c\omega} = 0$ c. $\frac{1}{a\omega} + \frac{1}{b\omega^2} + \frac{1}{c} = 0$ d. none

of these

 [Watch Video Solution](#)

51. Prove that the determinant $\begin{vmatrix} x & \sin\theta & \cos\theta \\ -\sin\theta & -x & 1 \\ \cos\theta & 1 & x \end{vmatrix}$ is independent of θ

 [Watch Video Solution](#)

52. Consider the determinant $f(x) = \begin{vmatrix} 0x^2 - ax^3 - bx^2 + a0x^2 + cx^4 + bx - c0 \end{vmatrix}$

Statement 1: $f(x) = 0$ has one root $x = 0$. Statement 2: The value of skew symmetric determinant of odd order is always zero.

 [Watch Video Solution](#)

53. Find the value of $|124 - 130410|$



Watch Video Solution

54. Consider the system of the equation $kx + y + z = 1$, $x + ky + z = k$, and $x + y + kz = k^2$. Statement 1: System equations has infinite solutions when $k = 1$. Statement 2: If the determinant $\begin{vmatrix} 1 & 1 & 1 \\ k & k & 1 \\ k^2 & 1 & k \end{vmatrix} = 0$, then $k = -1$.



Watch Video Solution

55. If $x + y + z = 0$ prove that $|axbyczcyazbxzcxay| = xyz|abaca|$



Watch Video Solution

56. If $a, b, c \in R$, then find the number of real roots of the equation

$$\Delta = \begin{vmatrix} x & c & -b \\ -c & x & a \\ b & -a & x \end{vmatrix} = 0$$

 [Watch Video Solution](#)

57. $\Delta = \begin{vmatrix} a & a^2 & 0 \\ 1 & 2a + b & (a + b) \\ 0 & 1 & 2a + 3b \end{vmatrix}$ is divisible by $a + b$ b. $a + 2b$ c. $2a + 3b$ d. a^2

 [Watch Video Solution](#)

58. Without expanding at any stage, prove that the value of each of the

following determinants is zero. (1) $\begin{vmatrix} 0 & p - q & p - r \\ q - p & 0 & q - r \\ r - p & r - q & 0 \end{vmatrix}$ (2) $\begin{vmatrix} 41 & 1 & 5 \\ 79 & 7 & 9 \\ 29 & 5 & 3 \end{vmatrix}$ (3)

$$\begin{vmatrix} 1 & w & w^2 \\ w & w^2 & 1 \\ w^2 & 1 & w \end{vmatrix}, \text{ where } w \text{ is cube root of unity}$$



Watch Video Solution

59. If a, b, c are positive and are the p th, q th, r th terms respectively of a GP

$$\text{then } \begin{vmatrix} \log a & p & 1 \\ \log b & q & 1 \\ \log c & r & 1 \end{vmatrix} =$$



Watch Video Solution

60. If the entries in a 3×3 determinant are either 0 or 1, then the greatest value of their determinants is



Watch Video Solution

61. The value of the determinant of n^{th} order, being given by $|x111x111x|$ is
($x - 1$) $^{n-1}$ ($x + n - 1$) b. ($x - 1$) n ($x + n - 1$) c. ($1 - x$) $^{-1}$ ($x + n - 1$) d. none of these



Watch Video Solution

62. Prove that $a \neq 0$, $\begin{bmatrix} x+a & x & x \\ x & x+a & x \\ x & x & x+a^2 \end{bmatrix} = 0$ represents a straight line

parallel to the y-axis.

 [Watch Video Solution](#)

63. If $a_1b_1, c_1, a_2b_2c_2$ and $a_3b_3c_3$ are three digit even natural numbers and $= \left| c_1a_1b_1c_2a_2b_2c_3a_3b_3 \right|$, then is divisible by 2 but not necessarily by 4 divisible by 4 but not necessarily by 8 divisible by 8 none of these

 [Watch Video Solution](#)

64. If $= \begin{vmatrix} abc & b^2c & c^2b \\ abc & c^2a & ca^2 \\ abc & a^2b & b^2a \end{vmatrix} = 0$, ($a, b, c \in R$) and are all different and

nonzero), then prove that $a + b + c = 0$.



 Watch Video Solution

65. The value of $\begin{vmatrix} yz & zx & xy \\ p & 2p & 3r \\ 1 & 1 & 1 \end{vmatrix}$, where x, y, z are respectively, p th, $(2q)$ th, and

$(3r)$ th terms of an H.P. is a.-1 b. 0 c. 1 d. none of these

 Watch Video Solution

66. Show that the determinant

$$\begin{vmatrix} a^2 + b^2 + c^2 & bc + ca + ac & ca + ab & ab + bc + ca \\ a^2 + b^2 + c^2 & bc + ca + ac & ca + ab & ab + bc + ca \\ a^2 + b^2 + c^2 & bc + ca + ac & ca + ab & ab + bc + ca \\ a^2 + b^2 + c^2 & bc + ca + ac & ca + ab & ab + bc + ca \end{vmatrix}$$

is always non-negative. When is the determinant zero?

 Watch Video Solution

67. If $x \neq 0, y \neq 0, z \neq 0$ and $\begin{vmatrix} 1+x & 1 & 1 \\ 1+y & 1+2y & 1 \\ 1+z & 1+z & 1+3z \end{vmatrix} = 0$, then

$x^{-1} + y^{-1} + z^{-1}$ is equal to a.1 b.-1 c.-3 d. none of these



Watch Video Solution

68. If $x \neq y \neq z$ and $\begin{vmatrix} x & x^2 & 1+x^3 \\ y & y^2 & 1+y^3 \\ z & z^2 & 1+z^3 \end{vmatrix} = 0$, then the value of xyz is a. 1 b. 2 c. -1

d. 2



Watch Video Solution

69.

Prove

that

$$|2\alpha + \beta + \gamma + \delta| \alpha\beta + \gamma\delta \alpha + \beta + \gamma + \delta = 2(\alpha + \beta)(\gamma + \delta) \alpha\beta(\gamma + \delta) + \gamma\delta(\alpha + \beta)\alpha\beta + \gamma\delta\alpha\beta(\gamma + \delta)$$



Watch Video Solution

70. Solve for x , $|x - 6 - 12 - 3x - 3 - 32x + 2| = 0$.



Watch Video Solution

71. The value of determinant $\begin{vmatrix} 1 & 1 & 1 \\ 1^m C_1^{m+1} & 1^m C_1^{m+2} & 1^m C_1^{m+1} \\ C_1^m C_2^{m+1} & C_2^{m+2} & C_2^m \end{vmatrix}$ is equal to 1 b. -1 c. 0 d. none of these

 [Watch Video Solution](#)

72. Solve the equation $|a - x \quad c \quad b \quad c \quad b - x \quad a \quad b \quad a \quad c - x| = 0$ where $a + b + c \neq 0$.

 [Watch Video Solution](#)

73. If $a^2 + b^2 + c^2 = -2$ and $f(x) = |a + a^2x(1 + b^2)x(1 + c^2)x(1 + a^2)x1 + b^2x(1 + c^2)x(1 + a^2)x(1 + b^2)x1 + c^2x|$, then $f(x)$ is a polynomial of degree 0 b. 1 c. 2 d. 3

 [Watch Video Solution](#)

74. Consider the set A of all determinants of order 3 with entries 0 or 1 only. Let B be the subset of A consisting of all determinants with value 1. Let C be the subset of the set of all determinants with value -1. Then



Watch Video Solution

75.

Solve:

$$|x^2 - 1x^2 + 2x + 12x^2 + 3x + 12x^2 + x - 12x^2 + 5x - 32x^2 + 4x - 36x^2 - x - 26x^2 - 7x$$



Watch Video Solution

76. If $|x3636x6x3| = |2x7x7272x| = |45x5x4x45| = 0$, then x is equal to 0 b. -9

c. 3 d. none of these



Watch Video Solution

77. If $A_1B_1C_1, A_2B_2C_2$ and $A_3B_3C_3$ are three digit numbers, each of which

is divisible by k , then $\Delta = \begin{vmatrix} A_1 & B_1 & C_1 \\ A_2 & B_2 & C_2 \\ A_3 & B_3 & C_3 \end{vmatrix}$ is



Watch Video Solution

78. If $f'(x) = |mxmx - pmx + p \cap + pn - pmx + 2nmx + 2n + pmx + 2n - p|$,
 then $y = f(x)$ represents a straight line parallel to x-axis a straight line
 parallel to y-axis parabola a straight line with negative slope

 [Watch Video Solution](#)

79. If $\sum_{n=1}^n \alpha_n = an^2 + bn$, where a, b are constants and
 $\alpha_1, \alpha_2, \alpha_3 \in \{1, 2, 3, \dots, 9\}$ and $25\alpha_1, 37\alpha_2, 49\alpha_3$ be three digit number,
 then prove that $|\alpha_1\alpha_2\alpha_3 57925\alpha_1 37\alpha_2 49\alpha_3| = 0$

 [Watch Video Solution](#)

80. The determinant $|\begin{matrix} xp + y & xy & yz \\ yx & yy & zy \\ zy & 0 & xp + y \end{matrix}| = 0$ if x, y, z

 [Watch Video Solution](#)

81. Using properties of determinant prove that

$$|a + b + c \quad c - b - ca \quad a + b + c - a - b - aa + b + c| = 2(a + b)(b + c)(c + a)$$

 Watch Video Solution

82. Show that

$$\left| \begin{matrix} {}^x C_r & {}^x C_{r+1} & {}^x C_{r+2} \\ {}^y C_r & {}^y C_{r+1} & {}^y C_{r+2} \\ {}^z C_r & {}^z C_{r+1} & {}^z C_{r+2} \end{matrix} \right| = \left| \begin{matrix} {}^x C_r^{x+1} & {}^x C_{r+1}^{x+2} & {}^y C_{r+2} \\ {}^y C_r^{y+1} & {}^y C_{r+1}^{y+2} & {}^y C_{r+2} \\ {}^z C_r^{z+1} & {}^z C_{r+1}^{z+2} & {}^z C_{r+2} \end{matrix} \right|$$

 Watch Video Solution

83. If $\omega \neq 1$ is a cube root of unity and $x + y + z \neq 0$, then prove that

$$\left| \begin{matrix} x & y & z \\ 1 + \omega & \omega + \omega^2 & \omega^2 + 1 \\ \omega + \omega^2 & \omega^2 + 1 & 1 + \omega \end{matrix} \right| = 0 \quad \text{if}$$

$$x = y = z$$

 Watch Video Solution

84. Statement 1: If the system of equation

$$\lambda x + (b - a)y + (c - a)z = 0, (a - b)x + \lambda y + (c - b)z = 0, \text{ and } (a - c)x + (b - c)y + \lambda z = 0$$

has a non trivial solution, then the value of λ is 0. Statement 2: the value of skew symmetric matrix of order 3 is order.

 [Watch Video Solution](#)

85. If A, B and C are the angles of a triangle, show that

$$-1 + \cos B \cos C + \cos B \cos B \cos C + \cos A - 1 + \cos A \cos A - 1 + \cos B - 1 + \cos A - 1$$

 [Watch Video Solution](#)

86. If α, β, γ are the angles of a triangle and system of equations

$$\cos(\alpha - \beta)x + \cos(\beta - \gamma)y + \cos(\gamma - \alpha)z = 0$$

$$\cos(\alpha + \beta)x + \cos(\beta + \gamma)y + \cos(\gamma + \alpha)z = 0$$

$\sin(\alpha + \beta)x + \sin(\beta + \gamma)y + \sin(\gamma + \alpha)z = 0$ has non-trivial solutions, then

triangle is necessarily a. equilateral b. isosceles c. right angled d. acute angled





Watch Video Solution

87. Without expanding the determinants, prove that

$$|103115114111108106104113116| + |113116104108106111115114103| = 0$$



Watch Video Solution

88. Given $a = x/(y - z)$, $b = y/(z - x)$, and $c = z/(x - y)$, where x , y , and z are not all zero, then the value of $ab + bc + ca$ is 0 b. 1 c. -1 d. none of these



Watch Video Solution

89. Find the value of determinant

$$\begin{vmatrix} \sqrt{13} + \sqrt{32}\sqrt{5}\sqrt{5}\sqrt{15} & \sqrt{(26)5}\sqrt{(10)3} & \sqrt{(65)}\sqrt{(15)5} \\ \sqrt{13} & \sqrt{32}\sqrt{5}\sqrt{5}\sqrt{15} & \sqrt{(26)5}\sqrt{(10)3} \\ \sqrt{(26)5}\sqrt{(10)3} & \sqrt{(65)}\sqrt{(15)5} & \sqrt{13} \end{vmatrix}$$



Watch Video Solution

90. a, b, c are distinct real numbers not equal to one. If $ax + y + z = 0$, $x + by + z = 0$, and $x + y + cz = 0$ have nontrivial solution, then the value of $\frac{1}{1-a} + \frac{1}{1-b} + \frac{1}{1-c}$ is equal to a. 1 b. -1 c. zero d. none of these

 [Watch Video Solution](#)

91. Prove that the value of the determinant

$$\begin{vmatrix} -75 + 3i & \frac{2}{3} - 4i & 5 - 3i & 84 + 5i \\ \frac{2}{3} + 4i & -fi & 9 & \end{vmatrix} \text{ is real.}$$

 [Watch Video Solution](#)

92. If the system of linear equation $x + y + z = 6$, $x + 2y + 3z = 14$, and $2x + 5y + \lambda z = \mu$ ($\lambda, \mu \in \mathbb{R}$) has a unique solution, then $\lambda = 8$ b. $\lambda = 8, \mu = 36$ c. $\lambda = 8, \mu \neq 36$ d. none of these

 [Watch Video Solution](#)

93. If $a_r = (\cos 2r\pi + is \in 2r\pi)^{1/9}$, then prove that

$$|a_1 a_2 a_3 a_4 a_5 a_6 a_7 a_8 a_9| = 0.$$

 [Watch Video Solution](#)

94. Let $f(x) = \left| 2\cos^2 x \sin 2x - \sin x \sin 2x 2\sin^2 x \cos x \sin x - \cos x 0 \right|$. Then the value of $\int_0^{\pi/2} [f(x) + f'(x)] dx$ is a. π b. $\pi/2$ c. 2π d. $3\pi/2$

 [Watch Video Solution](#)

95. Using properties of determinants, prove that

$$\begin{vmatrix} -a^2 & ab & ac \\ ba & -b^2 & bc \\ ca & cb & -c^2 \end{vmatrix} = 4a^2 b^2 c^2$$

 [Watch Video Solution](#)

96. The number of positive integral solutions of the equation

$$\begin{vmatrix} x^3 + 1 & x^2y & x^2z \\ xy^2 & y^3 + 1 & y^2z \\ xz^2 & z^2y & z^3 + 1 \end{vmatrix} = 11 \text{ is}$$

 [Watch Video Solution](#)

97. If the value of the determinant $|a111b111c|$ is positive then $(a, b, c > 0)$

$abc > 1$ b. $abc < -8$ c. $abc < -8$ d. $abc > 2$

 [Watch Video Solution](#)

98. By using properties of determinants. Show that: (i)

$$\begin{vmatrix} x+4 & 2x & 2x \\ 2x & x+4 & 2x \\ 2x & 2x & x+4 \end{vmatrix} = (5x-4)(4-x)^2 \text{ (ii)} \quad \begin{vmatrix} y+k & y & y \\ y & y+k & y \\ y & y & y+k \end{vmatrix} = k^2(3y+k)$$

 [Watch Video Solution](#)

99. Using properties of determinants, evaluate $|184089408919889198440|$

 [Watch Video Solution](#)

100. If A_1, B_1, C_1, \dots are respectively, the cofactors of the elements a_1, b_1, c_1, \dots of the determinant $\Delta = \begin{vmatrix} a_1 & b_1 & c_1 \\ a_2 & b_2 & c_2 \\ a_3 & b_3 & c_3 \end{vmatrix}$, $\Delta \neq 0$, then the value of $\begin{vmatrix} B_2 & C_2 & B_3 & C_3 \end{vmatrix}$ is equal to a. 12 b. a_1 c. a_1^2 d. $a_1 2^2$

 [Watch Video Solution](#)

101. Solve for x $|x - 22x - 33 \times - 4x - 42x - 93x - 16x - 82x - 273x - 64| = 0$.

 [Watch Video Solution](#)

102. If $\Delta_1 = |xaxbaax|$ and $\Delta_2 = |xbax|$ are the given determinants,

then $\Delta_1 = 3(\Delta_2)^2$ b. $\frac{d}{dx}(\Delta_1) = 3\Delta_2$ c.

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

 [Watch Video Solution](#)

103. Without expanding evaluate the determinant

$$\begin{vmatrix} \sin\alpha & \cos\alpha & \sin(\alpha + \delta) \\ \sin\beta & \cos\beta & \sin(\beta + \delta) \\ \sin\gamma & \cos\gamma & \sin(\gamma + \delta) \end{vmatrix}$$

 [Watch Video Solution](#)

104. If $y = \sin mx$, then the value of the determinant

$$\begin{vmatrix} y & y_1 & y_2 & y_3 & y_4 & y_5 & y_6 & y_7 & y_8 \end{vmatrix}, \text{ where } y_n = \frac{d^n y}{dx^n} \text{ is } m^9 \text{ b. } m^2 \text{ c. } m^3 \text{ d. none of these}$$

 [Watch Video Solution](#)

105. Find the value of the determinant $|1111123413610141020|$

 [Watch Video Solution](#)

106. The parameter on which the value of the determinant $\begin{vmatrix} 1 & a^2 \cos(p-d)x & \cos px & \cos(p+d)x \\ \sin(p-d)x & \sin px & \sin(p+d)x & x \end{vmatrix}$ does not depend is a b. p c. d d. x

 [Watch Video Solution](#)

107. If $x = cy + bz$, $y = az + cx$, $z = x + ay$, where x, y, z are not all zeros, then find the value of $a^2 + b^2 + c^2 + 2abc$.

 [Watch Video Solution](#)

108. If $\begin{vmatrix} b^2 + c^2 & ab & ac \\ ab & c^2 + a^2 & bc \\ ca & cb & a^2 + b^2 \end{vmatrix} = ka^2b^2c^2$, then the value of k is abc b. $a^2b^2c^2$ c. $bc + ca + ab$ d. none of these

 [Watch Video Solution](#)

109. The value of $\left| -1213 + 2\sqrt{22} + 2\sqrt{213} - 2\sqrt{22} - 2\sqrt{21} \right|$ is equal to a. zero b. $-16\sqrt{2}$ c. $-8\sqrt{2}$ d. none of these

 [Watch Video Solution](#)

110. Find the following system of equations is consistent, $(a + 1)^3x + (a + 2)^3y = (a + 3)^3$ $(a + 1)x + (a + 2)y = a + 3$ $x + y = 1$, then find the value of a

 [Watch Video Solution](#)

111. Prove the identities:
$$\begin{vmatrix} b^2 + c^2 & ab & ac \\ ba & c^2 + a^2 & bc \\ ca & cb & a^2 + b^2 \end{vmatrix} = 4a^2b^2c^2$$

 [Watch Video Solution](#)

112. If $\left| \begin{matrix} 1 & 1 & 1 \\ a & b & c \\ a^3 & b^2 & c^3 \end{matrix} \right| = (a - b)(b - c)(c - a)(a + b + c)$, where a, b, c are different, then the determinant

$\left| \begin{matrix} 1 & 1 & 1 \\ x - a & x - b & x - c \\ (x - a)^2 & (x - b)^2 & (x - c)^2 \end{matrix} \right|$ vanishes when

a. $a + b + c = 0$ b. $x = \frac{1}{3}(a + b + c)$ c. $x = \frac{1}{2}(a + b + c)$ d. $x = a + b + c$

 [Watch Video Solution](#)

113. Prove that

$$\begin{bmatrix} 1 + a^2 + a^4 & 1 + ab + a^2b^2 & 1 + ac + a^2c^2 \\ 1 + ab + a^2b^2 & 1 + b^2 + b^4 & 1 + bc + b^2c^2 \\ 1 + ac + a^2c^2 & 1 + bc + b^2c^2 & 1 + c^2 + c^4 \end{bmatrix} = (a - b)^2(b - c)^2(c - a)^2$$

 [Watch Video Solution](#)

114. The determinant $\left| \begin{matrix} y^2 & -xy & x^2 \\ a & b & c \\ a' & b' & c' \end{matrix} \right|$ is equal to a.

$\left| \begin{matrix} bx & aycx & byb'x & a'yc'x & b'y \end{matrix} \right|$ b. $\left| \begin{matrix} ax & bybx & cya'x & b'yb'x & c'y \end{matrix} \right|$ c.
 $\left| \begin{matrix} bx & cyax & byb'x & c'ya'x & b'y \end{matrix} \right|$ d. $\left| \begin{matrix} ax & bybx & cya'x & b'yb'x & c'y \end{matrix} \right|$

 [Watch Video Solution](#)

115. If x, y, z are in A.P., then the value of the determinant are in A.P., then the value of the determinant $|a + 2a + 3a + 2xa + 3a + 4a + 2ya + 4a + 5a + 2z|$ is a. 1 b. 0 c. $2a$ d. a

 [Watch Video Solution](#)

116. Prove that $(b+x)(c+x)(v+x)(a+x)(a+x)(b+x)(b+y)(c+y)(c+x)(a+t)(a+y)(b+y)(b$

 [Watch Video Solution](#)

117. If $a + b + c = 0$, one root of $\begin{bmatrix} a-x & c & b \\ c & b-x & a \\ b & a & c-x \end{bmatrix} = 0$ is a. $x = 1$ b. $x = 2$ c. $x = a^2 + b^2 + c^2$ d. $x = 0$

 [Watch Video Solution](#)

118. Factorise the following

$$\begin{vmatrix} 3 & a+b+c & a^3+b^3+c^3 \\ a+b+c & a^2+b^2+c^2 & a^4+b^4+c^4 \\ a^2+b^2+c^2 & a^3+b^3+c^3 & a^5+b^5+c^5 \end{vmatrix}$$

 Watch Video Solution

119. Let $\{D_1, D_2, D_3, D_n\}$ be the set of third order determinant that can be made with the distinct non-zero real numbers a_1, a_2, a_q . Then

$\sum_{i=1}^n D_i = 1$ b. $\sum_{i=1}^n D_i = 0$ c. $D_i - D_j, \forall i, j$ d. none of these

 Watch Video Solution

120. If $g(x) = \frac{f(x)}{(x-a)(x-b)(x-c)}$, where $f(x)$ is a polynomial of degree < 3 ,

then

$$\int g(x) dx = \begin{vmatrix} 1 & a & f(a)\log|x-a| \\ 1 & b & f(b)\log|x-b| \\ 1 & c & f(c)\log|x-c| \end{vmatrix} \div \begin{vmatrix} 1 & a & a^2 \\ 1 & b & b^2 \\ 1 & c & c^2 \end{vmatrix} + k$$

$$\frac{dg(x)}{dx} = \begin{vmatrix} 1 & a & -f(a)(x-a)^{-2} \\ 1 & b & -f(b)(x-b)^{-2} \\ 1 & c & -f(c)(x-c)^{-2} \end{vmatrix} : - \begin{vmatrix} 1 & a & a^2 \\ 1 & b & b^2 \\ 1 & c & c^2 \end{vmatrix}$$

 [Watch Video Solution](#)

121. If the equation $2x + 3y + 1 = 0$, $3x + y - 2 = 0$, and $ax + 2y - b = 0$ are consistent, then prove that $a - b = 2$.

 [Watch Video Solution](#)

122. If w is a complex cube root of unity, then value of $a_1 + b_1wa_1w^2 + b_1c_1 + b_1wa_2 + b_2wa_2w^2 + b_2c_2 + b_2wa_3 + b_3wa_3w^2 + b_3c_3$ is a. 0 b. -1 c. 2 d. none of these

 [Watch Video Solution](#)

123.

Let

$$f(x) = \left| \cos(x + x^2) \sin(x + x^2) - \cos(x + x^2) \sin(x - x^2) \cos(x - x^2) \sin(x - x^2) \right| \sin 2x$$

. Find the value of $f'(0)$

 [Watch Video Solution](#)

124. If $f(x)$, $g(x)$ and $h(x)$ are three polynomial of degree 2, then prove that

$\phi(x) = |f(x)g(x)h(x)f'(x)g'(x)h'(x)f''(x)g''(x)h''(x)|$ is a constant polynomial.

 [Watch Video Solution](#)

125. If a, b, c are in G.P. with common ratio r_1 and α, β, γ are in G.P. with common ratio r_2 and equations $ax + \alpha y + z = 0$, $bx + \beta y + z = 0$, $cx + \gamma y + z = 0$ have only zero solution, then which of the following is not true? a. $a + b + c$ b. abc c. 1 d. none of these

 [Watch Video Solution](#)

126. Show that: $|ab - + ba + abc - aa - + ac| = (a + b + c)(a^2 + b^2 + c^2)$

[Watch Video Solution](#)

127. In triangle ABC , if

$\left| 111 \frac{\cot A}{2} \frac{\cot B}{2} \frac{\cot C}{2} \frac{\tan B}{2} + \frac{\tan C}{2} \frac{\tan B}{2} + \frac{\tan A}{2} \frac{\tan A}{2} + \frac{\tan B}{2} \right|$ then the triangle must be a. equilateral b. isosceles c. obtuse angled d. none of these

[Watch Video Solution](#)

128. If $a, b, c, d, e,$ and f are in G.P. then the value of $\begin{vmatrix} (a^2) & (d^2) & x \\ (b^2) & (e^2) & y \\ (c^2) & (f^2) & z \end{vmatrix}$ depends on (A) x and y (B) x and z (C) y and z (D) independent of $x, y,$ and

[Watch Video Solution](#)

129. Prove that:

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

[Watch Video Solution](#)

130. If $x_i = a_i b_i c_i + i$, $i = 1, 2, 3$ are three-digit positive integer such that each x_i is a multiple of 19, then for some integers n , prove that

$$\left| a_1 a_2 a_3 b_1 b_2 b_3 c_1 c_2 c_3 \right| \text{ is divisible by } 19.$$

[Watch Video Solution](#)

131. The system of linear equations $x + \lambda y - z = 0$ $\lambda x - y - z = 0$ $x + y - \lambda z = 0$ has a non-trivial solution for : (1) infinitely many values of λ . (2) exactly

one value of λ . (3) exactly two values of λ . (4) exactly three values of λ .



Watch Video Solution

132. If $pqr \neq 0$ and the system of equation $(p + a)x + by + cz = 0$
 $ax + (q + b)y + cz = 0$ $ax + by + (r + c)z = 0$ has nontrivial solution, then
value of $\frac{a}{p} + \frac{b}{q} + \frac{c}{r}$ is -1 b. 0 c. 0 d. ∞ - 2



Watch Video Solution

133. If $c < 1$ and the system of equations
 $x + y - 1 = 0$, $2x - y - c = 0$, and $bx + 3by - c = 0$ is consistent, then the
possible real values of b are $b\left(-3\frac{3}{4}\right)$ b. $b\left(-\frac{3}{2}, 4\right)$ c. $b\left(-\frac{3}{4}, 3\right)$ d. none of
these



Watch Video Solution

134. Prove that

$$\left| x^2x^2 - (y-z)^2yz^2y^2 - (z-x)^2z^2z^2 - (x-y)^2xy \right| = (x-y)(y-z)(z-x)(x+y+z) \left(x^2 + y^2 + z^2 \right)$$

 [Watch Video Solution](#)

135. If a, b and c are real numbers, and $\Delta = \begin{vmatrix} b+c & c+a & a+b \\ c+a & a+b & b+c \\ a+b & b+c & c+a \end{vmatrix} = 0$.

Show that either $a + b + c = 0$ or $a = b = c$

 [Watch Video Solution](#)

136. If a, b, c are non-zero, then the system of equations $(\alpha + a)x + \alpha y + \alpha z = 0$, $\alpha x + (\alpha + b)y + \alpha z = 0$, $\alpha x + \alpha y + (\alpha + c)z = 0$ has a non-trivial solution if $\alpha^{-1} =$ (A) $-(a^{-1} + b^{-1} + c^{-1})$ (B) $a + b + c$ (C) $\alpha + a + b + c = 1$ (D) none of these

 [Watch Video Solution](#)

137. Prove that

$$\left| ab + ca^2bc + ab^2ca + bc^2 \right| = -(a + b + c) \times (a - b)(b - c)(c - a)$$

 [Watch Video Solution](#)

138. If $a > 0$ and discriminant of $ax^2 + 2bx + c$ is negative, then

$$\begin{vmatrix} a & b & ax + b \\ b & c & bx + c \\ ax + b & bx + c & 0 \end{vmatrix} \text{ is +ve b. } (ac - b)^2 (ax^2 + 2bx + c) \text{ c. -ve d. 0}$$

 [Watch Video Solution](#)

139. Using the properties of determinants, prove that following

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

 [Watch Video Solution](#)

140. If $a_1, a_2, a_3, \dots, a_n, \dots$ are in G.P. then the determinant

$$\Delta = \begin{vmatrix} \log a_n & \log a_{n+1} & \log a_{n+2} \\ \log a_{n+3} & \log a_{n+4} & \log a_{n+5} \\ \log a_{n+6} & \log a_{n+7} & \log a_{n+8} \end{vmatrix} \text{ is equal to- (A) -2 (B) 1 (C) -1 (D) 0}$$

 [Watch Video Solution](#)

141. Using properties of determinants, prove the following

$$\begin{vmatrix} a^2 & ab & ac \\ ab & b^2 + 1 & bc \\ ca & cb & c^2 + 1 \end{vmatrix} = 1 + a^2 + b^2 + c^2.$$

 [Watch Video Solution](#)

142. Let $\vec{a}_r = x_r \hat{i} + y_r \hat{j} + z_r \hat{k}$, $r = 1, 2, 3$ be three mutually perpendicular

unit vectors, then the value of $\begin{vmatrix} x_1 & x_2 & x_3 \\ y_1 & y_2 & y_3 \\ z_1 & z_2 & z_3 \end{vmatrix}$ is equal to 0 b. ± 1 c. ± 2 d.

none of these



Watch Video Solution

143. The number of distinct real roots of $\begin{vmatrix} \sin x & \cos x & \cos x \\ \cos x & \sin x & \cos x \\ \cos x & \cos x & \sin x \end{vmatrix} = 0$ in the interval $\pi/4 \leq x \leq \pi/4$ is 0 b. 2 c. 1 d. 3



Watch Video Solution

144. Let a, b, c be real numbers with $a^2 + b^2 + c^2 = 1$. Show that the equation

$$|ax - by - cbx - aycx + abx + ay - ax + by - y + bcx + acy + b - ax - by + c| = 0$$

represents a straight line.



Watch Video Solution

145. If lines $px + qy + r = 0$, $qx + ry + p = 0$ and $rx + py + q = 0$ are concurrent, then prove that $p + q + r = 0$ (where p, q, r are distinct).

 [Watch Video Solution](#)

146. If $p\lambda^4 + q\lambda^3 + r\lambda^2 + s\lambda + t = \begin{vmatrix} \lambda^2 + 3\lambda & \lambda - 1 & \lambda + 3 \\ \lambda^2 + 1 & 2 - \lambda & \lambda - 3 \\ \lambda^2 - 3 & \lambda + 4 & 3\lambda \end{vmatrix}$ then $t =$

 [Watch Video Solution](#)

147. Find the value of λ if $2x^2 + 7xy + 3y^2 + 8x + 14y + \lambda = 0$ represent a pair of straight lines.

 [Watch Video Solution](#)

148. If x, y, z are different from zero and $\Delta = \begin{vmatrix} a & b-y & c-z \\ a-x & b & c-z \\ a-x & b-y & c \end{vmatrix} = 0$,

then the value of the expression $\frac{a}{x} + \frac{b}{y} + \frac{c}{z}$ is 0 b. -1 c. 1 d. 2

 [Watch Video Solution](#)

149. If A, B, C are angles of a triangles, then the value of

$$\begin{vmatrix} e^{2iA} & e^{-iC} & e^{-iB} \\ e^{-iC} & e^{2iB} & e^{-iA} \\ e^{-iB} & e^{-iA} & e^{2iC} \end{vmatrix}$$

is 1 b. -1 c. -2 d. -4

 [Watch Video Solution](#)

150. If $a^2 + b^2 + c^2 = 1$, then prove that

$$\left[a^2 + (b^2 + c^2) \cos \phi \right] ab(1 - \cos \phi) + ac(1 - \cos \phi) + ba(1 - \cos \phi) + b^2 + (c^2 + a^2) \cos \phi bc(1 - \cos \phi)$$

is independent of a, b, c .

 [Watch Video Solution](#)

151. For the equation $\begin{vmatrix} 1 & x & x^2 \\ x^2 & 1 & x \\ x & x^2 & 1 \end{vmatrix} = 0$, There are exactly two distinct

roots There is one pair of equation real roots. There are three pairs of equal roots Modulus of each root is 2

 [Watch Video Solution](#)

152. Let $\Delta_r = \left| r - 1 \quad 6(r-1)^2 \quad 2n^2 \quad 4n - 2(r-1)^2 \quad 3n^3 \quad 3n^2 - 3n \right|$ Show that

$\sum_{r=1}^n \Delta_r$ is constant.

 [Watch Video Solution](#)

153. Let m be a positive integer and $\Delta_r = \begin{vmatrix} 2r - 1 & {}^m C_r & 1 \\ m^2 - 1 & 2^m & m + 1 \\ \sin^2(m^2) & \sin^2 m & \sin(m^2) \end{vmatrix}$. Then

the value of $\sum_{r=0}^m \Delta_r$

 [Watch Video Solution](#)

154. Prove that

$$|1 + a11111 + b11111 + c11111 + d| = abcd \left(a + \frac{1}{a} + \frac{1}{b} + \frac{1}{c} + \frac{1}{d} \right). \quad \text{Hence}$$

find the value of the determinant if a, b, c, d are the roots of the equation

$$px^4 + qx^3 + rx^2 + sx + t = 0.$$

 [Watch Video Solution](#)

155. Find the area of a triangle whose vertices are

$A(3, 2), B(11, 8)$ and $C(8, 12)$

 [Watch Video Solution](#)

 Watch Video Solution

156. If $D_k = 1 + 2kn^2 + n + 1n^2 + n2k - 1n^2n^2 + n + 1$ and $\sum_{k=1}^n D_k = 56$. then n equals 4 b. 6 c. 8 d. none of these

 Watch Video Solution

157. If lines $px + by = c$, $ax + qy = c$ and $ax + by = r$ ($a \neq p$, $b \neq q$, $c \neq r$) are concurrent then find the value and $\frac{p}{p-a} + \frac{q}{q-b} + \frac{r}{r-c}$.

 Watch Video Solution

158. If x_1, x_2, x_3 as well as y_1, y_2, y_3 are in G.P. with same common ratio, then prove that the points (x_1, y_1) , (x_2, y_2) , and (x_3, y_3) are collinear.

 Watch Video Solution

159. If the lines $a_1x + b_1y + 1 = 0$, $a_2x + b_2y + 1 = 0$ and $a_3x + b_3y + 1 = 0$ are concurrent, show that the point (a_1, b_1) , (a_2, b_2) and (a_3, b_3) are collinear.

 [Watch Video Solution](#)

160. For a fixed positive integer n , if $n! = |n!(n+1)!(n+2)!(n+1)!(n+2)!(n+3)!(n+2)!(n+3)!(n+4)!|$, then show that $\left[\frac{1}{(n!)^3} - 4 \right]$ is divisible by n .

 [Watch Video Solution](#)

161. Find the value of a for which the lines $2x + y - 1 = 0$, $2x + y - 1 = 0$, $ax + 3y - 3 = 0$ and $3x + 2y - 2 = 0$ are concurrent.

 [Watch Video Solution](#)

162. If the lines $ax + y + 1 = 0$, $x + by + 1 = 0$ and $x + y + c = 0$ (a, b, c being distinct and different from 1) are concurrent, then prove that

$$\frac{1}{1-a} + \frac{1}{1-b} + \frac{1}{1-c} = 1.$$

 [Watch Video Solution](#)

163. If $(1 + ax + bx^2)^4 = a_0 + a_1x + a_2x^2 + \dots + a_8x^8$ when

$a, b, a_0, a_1, a_2, \dots, a_8 \in R$ such that $a_0 + a_1 + a_2 \neq 0$ and
$$\begin{vmatrix} a_0 & a_1 & a_2 \\ a_1 & a_2 & a_3 \\ a_2 & a_0 & a_1 \end{vmatrix} = 0$$

then the value of $5\frac{a}{b}$ (A) 6 (B) 8 (C) 10 (D) 12

 [Watch Video Solution](#)

164. Find the value of λ for which the homogeneous system of equations:

$$2x + 3y - 2z = 0 \quad 2x - y + 3z = 0 \quad 7x + \lambda y - z = 0$$

has non-trivial solutions.

Find the solution.

 [Watch Video Solution](#)

 Watch Video Solution

165. If $f, g,$ and h are differentiable functions of x and

$$\Delta(x) = \begin{vmatrix} fgh & (xf)' & (xg)' & (xh)' \\ (x^2f)'' & (x^2g)'' & (x^2h)'' \\ (x^3f)''' & (x^3g)''' & (x^3h)''' \end{vmatrix}$$

prove that

 Watch Video Solution

166. Let a, b, c be positive and not all equal. Show that the value of the determinant $|abc|$ is negative.

 Watch Video Solution

167. if $\Delta = \begin{vmatrix} x^n & n! & 2 \\ \cos x & \cos \frac{n\pi}{2} & 4 \\ \sin x & \sin \frac{n\pi}{2} & 8 \end{vmatrix}$, then find the value of

$$\frac{d^n}{dx^n} [f(x)]_{x=0} \quad (n \in \mathbb{Z}).$$



Watch Video Solution

168. Without expanding a determinant at any stage, show that

$$\begin{vmatrix} x^2 + x & x + 1 & x + 2 \\ 2x^2 + 3x - 13x & 3x - 3 & x^2 + 2x + 3 \\ 2x - 1 & 2x - 1 & 2x - 1 \end{vmatrix} = xA$$

are determinant of order 3 not involving x



Watch Video Solution

169. Show that

$$\begin{vmatrix} bc - a^2 & ca - b^2 & ab - c^2 \\ ca - b^2 & ab - c^2 & bc - a^2 \\ ab - c^2 & bc - a^2 & ca - b^2 \end{vmatrix}$$

$$\begin{vmatrix} a^2 & c^2 & 2ca - b^2 \\ 2ab - c^2 & b^2 & a^2 \\ b^2 & 2ac - a^2 & c^2 \end{vmatrix}.$$



Watch Video Solution

170. Show that the system of equations $3x - y + 4z = 3$, $x + 2y - 3z = -2$ and $6x + 5y + \lambda z = -3$ has at least one solution for any real number λ .
Find the set of solutions of $\lambda = -5$

 [Watch Video Solution](#)

171. Express $\Delta = \begin{vmatrix} 2bc - a^2 & c^2 & b^2 \\ c^2 & 2ca - b^2 & a^2 \\ b^2 & a^2 & 2ab - c^2 \end{vmatrix}$ as square of a determinant

of hence evaluate if.

 [Watch Video Solution](#)

172. If $y = |\sin x \cos x \sin x \cos x - \sin x \cos x \times 11| = f \in d \frac{dy}{dx}$.

 [Watch Video Solution](#)

173. Consider the system of equation $x + y + z = 6$, $x + 2y + 3z = 10$, and $x + 2y + \lambda z = \mu$. Statement 1: if the system has infinite number of solutions, then $\mu = 10$. Statement 2: The determinant $|\begin{matrix} 1 & 1 & 1 \\ 1 & 2 & 3 \\ 1 & 2 & \mu \end{matrix}| = 0$ or $\mu = 10$.

 [Watch Video Solution](#)

174. Consider the system linear equations in $x, y, \text{ and } z$ given by $(\sin 3\theta)x - y + z = 0$, $(\cos 2\theta)x + 4y + 3z = 0$, $2x + 7y + 7z = 0$. the value of θ for which the system has a non-trivial solution : (A) $\theta = n\frac{\pi}{2}$ (B) $\theta = (2n + 1)\frac{\pi}{6}$ (C) $\theta = n\pi$ or $n\pi + (-1)^n\frac{\pi}{6}$ (D) none of these

 [Watch Video Solution](#)

175. Prove without expansion that $|ah + bgga + chbf + bafhb + bcfa + bbg + fc| = a|ah + bgahbf + bahbaf + bcgf|$

 [Watch Video Solution](#)

176. If α, β and γ are real numbers without expanding at any stage prove that

$$\begin{vmatrix} 1 & \cos(\beta - \alpha) & \cos(\gamma - \alpha) \\ \cos(\alpha - \beta) & 1 & \cos(\gamma - \beta) \\ \cos(\alpha - \gamma) & \cos(\beta - \gamma) & 1 \end{vmatrix} = 0.$$

 [Watch Video Solution](#)

177. If 3 digit numbers $A28, 3B9$ and $62C$ are divisible by a fixed constant 'K' where A, B, C are integers lying between 0 and 9, then determinant

$$\begin{vmatrix} A & 3 & 6 \\ 8 & 9 & C \\ 2 & B & 2 \end{vmatrix} \text{ is always divisible by}$$

 [Watch Video Solution](#)

178. If $a = \cos\theta + i\sin\theta, b = \cos2\theta - i\sin2\theta, c = \cos3\theta + i\sin3\theta$ and if

$$\begin{vmatrix} a & b & c \\ b & c & a \\ c & a & b \end{vmatrix} = 0 \text{ then } \theta = ?$$



Watch Video Solution

179. Prove that

$$|a_1\alpha_1 + b_1\beta_1a_1\alpha_2 + b_2\beta_2a_1\alpha_3 + b_1\beta_3a_2\alpha_1 + b_2\beta_1a_2\alpha_2 + b_2\beta_2a_2\alpha_3 + b_2\beta_3a_3\alpha_1 + \dots|$$



Watch Video Solution

180. If α, β, γ are the roots of $px^3 + qx^2 + r = 0$, then the value of the

determinant $\begin{vmatrix} \alpha\beta & \beta\gamma & \gamma\alpha \\ \beta\gamma & \gamma\alpha & \alpha\beta \\ \gamma\alpha & \alpha\beta & \beta\gamma \end{vmatrix}$ is p b. q c. 0 d. r



Watch Video Solution

181. Prove that

$$\left| (a-x)^2(a-y)^2(a-z)^2(b-x)^2(b-y)^2(b-z)^2(c-x)^2(c-y)^2(c-z)^2 \right| = \left| (1+ax)^2(1+bx)^2(1+cx)^2(1+ay)^2(1+by)^2(1+cy)^2(1+az)^2(1+bz)^2(1+cz)^2 \right|$$



Watch Video Solution

182. If $\left| 1 \times^2 \times^2 1x^2 1x \right| =$, then find the value of

$$\left| x^3 - 10x - x^4 0x - x^4 x^3 - 1x - x^4 x^3 - 10 \right|$$

 [Watch Video Solution](#)

183. If

$$\left| x^n x^{n+2} x^{n+3} y^n y^{n+2} y^{n+3} z^n z^{n+2} z^{n+3} \right| = (x-y)(y-z)(z-x) \left(\frac{1}{x} + \frac{1}{y} + \frac{1}{z} \right),$$

then n equals 1 b. -1 c. 2 d. -2

 [Watch Video Solution](#)

184. Solve the system of the equations: $ax + by + cz = d$
 $a^2x + b^2y + c^2z = d^2$ $a^3x + b^3y + c^3z = d^3$ Will the solution always exist and be unique?

 [Watch Video Solution](#)

185. If $|ab - + ba + cbc - aa - ba + bc| = 0$, then the line $ax + by + c = 0$ passes through the fixed point which is (1, 2) b. (1, 1) c. (- 2, 1) d. (1, 0)

 [Watch Video Solution](#)

186. If $2ax - 2y + 3z = 0$, $x + ay + 2z = 0$, and $2 + az = 0$ have a nontrivial solution, find the value of a

 [Watch Video Solution](#)

187. If $[]$ denotes the greatest integer less than or equal to the real number under consideration, and $-1 \leq x < 0$, $0 \leq y < 1$, $1 \leq a < 2$, then the value of the determinant $|\begin{vmatrix} [x] + 1 & [y] & [z] \\ [x] & [y] + 1 & [z] \\ [x] & [y] & [z] + 1 \end{vmatrix}|$ is $[x]$ b. $[y]$ c. $[z]$ d. none of these

 [Watch Video Solution](#)

188. If $f(x) = a + bx + cx^2$ and α, β, γ are the roots of the equation $x^3 = 1$, then $|abc|$ is equal to

a. $f(\alpha) + f(\beta) + f(\gamma)$ b. $f(\alpha)f(\beta) + f(\beta)f(\gamma) + f(\gamma)f(\alpha)$ c. $f(\alpha)f(\beta)f(\gamma)$ d. $-f(\alpha)f(\beta)f(\gamma)$

 [Watch Video Solution](#)

189. If x, y and z are not all zero and connected by the equations $a_1x + b_1y + c_1z = 0$, $a_2x + b_2y + c_2z = 0$, and $(p_1 + \lambda q_1)x + (p_2 + \lambda q_2)y + (p_3 + \lambda q_3)z = 0$, show that $\lambda = - \frac{|a_1b_1c_1a_2b_2c_2p_1p_2p_3|}{|a_1b_1c_1a_2b_2c_2q_1q_2q_3|}$

 [Watch Video Solution](#)

190. Find λ for which the system of equations $x + y - 2z = 0$, $2x - 3y + z = 0$, $x - 5y + 4z = \lambda$ is consistent and find the solutions for all such values of λ .

 [Watch Video Solution](#)

191. If p, q, r are in A.P. then value of determinant

$$\begin{vmatrix} a^2 + 2^{n+1} + 2pb^2 + 2^{n+2} + 3qc^2 + p2^n + p2^{n+1} & 2qa^2 + 2^n + pb^2 + 2^{n+1} & c^2 - r \end{vmatrix}$$

is 0 (b) Independent from a, b, c (c) $a^2b^2c^2 - 2^n$ (d) Independent from n



[Watch Video Solution](#)

192. For what values of k , the following system of equations possesses a nontrivial solution over the set of rationals:

$$c + ky + 3z = 0, 3c + ky - 2z = 0, 2c + 3y - 4x = 0.$$

Also find the solution for this value of k



[Watch Video Solution](#)

193. Let $a, b, c \in \mathbb{R}$ such that no two of them are equal and satisfy

$$\begin{vmatrix} 2a & b & c \\ b & c & 2a \\ c & 2a & b \end{vmatrix} = 0, \text{ then equation } 24ax^2 + 8bx + 4c = 0 \text{ has (a) at least one}$$

root in $[0, 1]$ (b) at last one root in $\left[-\frac{1}{2}, \frac{1}{2}\right]$ (c) at last one root in $[-1, 0]$

(d) at last two roots in $[0, 2]$

 [Watch Video Solution](#)

194. Solve by Cramers rule $x + y + z = 6$ $x - y + z = 2$ $3x + 2y - 4z = -5$

 [Watch Video Solution](#)

195. The value of the determinant $\begin{vmatrix} ka & k^2 + a^2 & 1 \\ kb & k^2 + b^2 & 1 \\ kc & k^2 + c^2 & 1 \end{vmatrix}$ is (A)

$k(a + b)(b + c)(c + a)$ (B) $abc(a^2 + b^2 + c^2)$ (C) $k(a - b)(b - c)(c - a)$ (D)

$k(a + b - c)(b + c - a)(c + a - b)$

 [Watch Video Solution](#)

196. Find the value of a and b if the system of equation $a^2x - by = a^2 - b$ and $bx = b^2y = 2 + 4b$ (i) posses unique solution (ii) infinite solutions

 **Watch Video Solution**

197. If $(x_1 - x_2)^2 + (y_1 - y_2)^2 = a^2$, $(x_2 - x_3)^2 + (y_2 - y_3)^2 = b^2$,
 $(x_3 - x_1)^2 + (y_3 - y_1)^2 = c^2$, and

$k \begin{vmatrix} x_1 & y_1 & 1 \\ x_2 & y_2 & 1 \\ x_3 & y_3 & 1 \end{vmatrix} = (a + b + c)(b + c - a)(c + a - b) \times (a + b - c)$, then the value

of k is 1 b. 2 c. 4 d. none of these

 **Watch Video Solution**

198. $f(x) = \left| \cos \times 12 \sin \times 2x \tan \times 1 \right|$. Then value of $(\lim)_{x \rightarrow 0} \frac{f(x)}{x}$ is equal to
 1 b. -1 c. zero d. none of these

 **Watch Video Solution**

199. If a system of three linear equations $x + 4ay + a = 0$, $x + 3by + b = 0$, and $x + 2cy + c = 0$ is consistent, then prove that a, b, c are in H.P.

 Watch Video Solution

200. Let α be a repeated root of a quadratic equation $f(x) = 0$ and $A(x), B(x), C(x)$ be polynomials of degrees 3, 4, and 5, respectively, then

show that $\begin{vmatrix} A(x) & B(x) & C(x) \\ A(\alpha) & B(\alpha) & C(\alpha) \\ A'(\alpha) & B'(\alpha) & C'(\alpha) \end{vmatrix}$ is divisible by $f(x)$, where prime ($'$)

denotes the derivatives.

 Watch Video Solution

201. If

$$\left| a^2 + \lambda^2 ab + \lambda ca - b\lambda ab - c\lambda b^2 + \lambda^2 bc + aca + b\lambda bc - a\lambda c^2 + \lambda^2 \right| \lambda c - b - c\lambda ab - a\lambda$$

, then the value of λ is 8 b. 27 c. 1 d. -1



Watch Video Solution

202. Value of

$\left| \begin{matrix} 1 & x_1 & x_1^2 \\ x_1 & 1 & x_1x_2 \\ x_1^2 & x_1x_2 & 1 \end{matrix} \right|$ depends upon only b. x_1 only c. x_2 only d. none of these



Watch Video Solution

203. If $\Delta(x) = \begin{vmatrix} \alpha + x\theta & x\lambda & x\beta & x\phi & x\mu & x\gamma & x\psi & x\nu & x \end{vmatrix}$ show that $\Delta'(x) = \Delta(0) + Sx$, where S denotes the sum of all the cofactors of all elements in $\Delta(0)$ and dash denotes the derivative with respect of x .



Watch Video Solution

204. The value of determinant

$\begin{vmatrix} bc & -a^2ac & -b^2ab & -c^2ac & -b^2ab & -c^2bc & -a^2ab & -c^2bc & -a^2ac & -b^2 \end{vmatrix}$ is a. always positive b. always negative c. always zero d. cannot say anything

 [Watch Video Solution](#)

205. If $l_1^2 + m_1^2 + n_1^2 = 1$ etc., and $l_1l_2 + m_1m_2 + n_1n_2 = 0$, etc. and

$$\Delta = \begin{vmatrix} l_1 & m_1 & n_1 \\ l_2 & m_2 & n_2 \\ l_3 & m_3 & n_3 \end{vmatrix} \text{ then}$$

 [Watch Video Solution](#)

206. Let $\left| \begin{matrix} x^2 & x^2x6 & x6 \\ \times 2 & \times 2x6 & \times 6 \end{matrix} \right| = Ax^4 + Bx^3 + Cx^2 + Dx + E$ Then the value of $5A + 4B + 3C + 2D + E$ is equal to a. zero b. -16 c. 11 d. 11

 [Watch Video Solution](#)

207. If the determinant

$$\begin{vmatrix} b & -a & -a' \\ -c & c' & -a' \\ -b' & b^{-c'} & c^{-a'} \end{vmatrix} = m |abc a' b' c' a'' b'' c''|,$$

then the value of m is 0 b. 2 c. 1 d. -1

 [Watch Video Solution](#)

208. Let a, b, c be the real numbers. The following system of equations in

$$x, y, \text{ and } z \quad \frac{x^2}{a^2} + \frac{y^2}{b^2} - \frac{z^2}{a^2} = 1, \quad \frac{x^2}{a^2} - \frac{y^2}{b^2} + \frac{z^2}{a^2} = 1, \quad -\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{a^2} = 1$$

has a. no solution b. unique solution c. infinitely many solutions d. finitely many solutions

 [Watch Video Solution](#)

209. The value of the determinant

$$\begin{vmatrix} \sin\theta & \cos\theta & \sin 2\theta \\ \sin\left(\theta + \frac{2\pi}{3}\right) & \cos\left(\theta + \frac{2\pi}{3}\right) & \sin\left(2\theta + \frac{4\pi}{3}\right) \\ \sin\left(\theta - \frac{2\pi}{3}\right) & \cos\left(\theta - \frac{2\pi}{3}\right) & \sin\left(2\theta - \frac{4\pi}{3}\right) \end{vmatrix}$$

 [Watch Video Solution](#)

210. Find the value of the determinant $|baabpqr111|$, where a , b , and c are respectively, the p th, q th, and r th terms of a harmonic progression.

 [Watch Video Solution](#)

211. let $a > 0, d > 0$ find the value of the determinant

$$\begin{vmatrix} \frac{1}{a} & \frac{1}{a(a+d)} & \frac{1}{(a+d)(a+2d)} \\ \frac{1}{a+d} & \frac{1}{(a+d)(a+2d)} & \frac{1}{(a+2d)(a+3d)} \\ \frac{1}{a+2d} & \frac{1}{(a+2d)(a+3d)} & \frac{1}{(a+3d)(a+4d)} \end{vmatrix}$$

 [Watch Video Solution](#)

212. Prove that

$$\begin{vmatrix} \cos(A - P) & \cos(A - Q) & \cos(A - R) \\ \cos(B - P) & \cos(B - Q) & \cos(B - R) \\ \cos(C - P) & \cos(C - Q) & \cos(C - R) \end{vmatrix} = 0.$$

 [Watch Video Solution](#)

213. Let λ and α be real. Find the set of all values of λ for which the system of linear equations

$$\lambda x + (\sin\alpha)y + (\cos\alpha)z = 0, x + (\cos\alpha)y + (\sin\alpha)z = 0, -x + (\sin\alpha)y - (\cos\alpha)z = 0.$$

have trivial solution

 [Watch Video Solution](#)

214. Prove that

$$|ax - by - cz \quad ay + bx \quad az + cy - ax - by| = (x^2 + y^2 + z^2)(ax^2 + by^2 + cz^2)$$

 [Watch Video Solution](#)

215. If $(x) = \begin{vmatrix} a_1 + xb_1 + xc_1 + xa_2 + xb_2 + xc_2 + xa_3 + xb_3 + xc_3 + x \\ \dots \\ \dots \end{vmatrix}$, show that $\Delta(x) = 0$ and that $\Delta(x) = (0) + Sx$, where S denotes the sum of all the cofactors of all the element in (0) .

 [Watch Video Solution](#)

216. If α, β, γ are different from 1 and are the roots of $ax^3 + bx^2 + cx + d = 0$ and $(\beta - \gamma)(\gamma - \alpha)(\alpha - \beta) = \frac{25}{2}$, then prove that

$$\left| \frac{\alpha}{1-\alpha} \frac{\beta}{1-\beta} \frac{\gamma}{1-\gamma} \alpha\beta\gamma \alpha^2\beta^2\gamma^2 \right| = \frac{25d}{2(a+b+c+d)}$$

 [Watch Video Solution](#)

217. If $p + q + r = 0 = a + b + c$, then the value of the determinant $\begin{vmatrix} pa & qb & rc \\ qb & rc & pa \\ rc & pa & qb \end{vmatrix}$ is 0 b. $pa + qb + rc$ c. 1 d. none of these

 [Watch Video Solution](#)

218. Let

$$\Delta = \begin{vmatrix} 2a_1b_1a_1b_2 + a_2b_1a_1b_3 + a_3b_1a_1b_2 & a_2b_12a_2b_2a_2b_3 + a_3b_2a_1b_3 + a_3b_1a_3b_2 \\ a_2b_12a_2b_2a_2b_3 + a_3b_2a_1b_3 + a_3b_1a_3b_2 & 2a_1b_1a_1b_2 + a_2b_1a_1b_3 + a_3b_1a_1b_2 \\ 2a_1b_1a_1b_2 + a_2b_1a_1b_3 + a_3b_1a_1b_2 & a_2b_12a_2b_2a_2b_3 + a_3b_2a_1b_3 + a_3b_1a_3b_2 \end{vmatrix}$$

. Expressing Δ as the product of two determinants, show that $\Delta = 0$. Hence,

show that if

$$ax^2 + 2hxy + by^2 + 2gx + 2fy + c = (lx + my + n)(l'x + m'y + n'), \text{ then } \begin{vmatrix} ah & hg & bf & gc \\ hg & bh & gf & fc \\ bf & gf & bh & fh \\ gc & fh & fh & ch \end{vmatrix} = 0$$

 Watch Video Solution

219. If $2s = a + b + c$ and $A = \begin{vmatrix} a^2 & (s-a)^2 & (s-a)^2 \\ (s-b)^2 & b^2 & (s-b)^2 \\ (s-c)^2 & (s-c)^2 & c^2 \end{vmatrix}$ then $\det A$

 Watch Video Solution

220. Evaluate $\begin{vmatrix} x & C_1^x & C_2^x & C_3^x & C_1^y & C_2^y & C_3^y & C_1^z & C_2^z & C_3^z \end{vmatrix}$

 Watch Video Solution

221. Prove that: $\begin{vmatrix} -2a & a+b & a+c \\ b+a & -2b & b+c \\ c+a & c+b & -2c \end{vmatrix} = 4(a+b)(b+c)(c+a)$

 Watch Video Solution

222. If a determinant of order 3×3 is formed by using the numbers 1 or -1 then minimum value of determinant is :

 [Watch Video Solution](#)

223. If $z = \sqrt{-53 + 4i5 - 7i3 - 4i68 + 7i5 + 7i8 - 7i9}$, then z is purely real purely imaginary $a + ib$, where $a \neq 0, b \neq 0$ d. $a + ib$, where $b = 4$

 [Watch Video Solution](#)

224. Let ω be the complex number $\cos\left(\frac{2\pi}{3}\right) + i\sin\left(\frac{2\pi}{3}\right)$. Then the number of distinct complex numbers z satisfying

$$\Delta = \begin{vmatrix} z+1 & \omega & \omega^2 \\ \omega & z+\omega^2 & 1 \\ \omega^2 & 1 & z+\omega \end{vmatrix} = 0 \text{ is}$$

 [Watch Video Solution](#)

225. If ω is the complex cube root of unity then

$$\begin{vmatrix} 1 & 1+i+\omega^2 & \omega^2 \\ 1-i & -1 & \omega^2-1 \\ -i & -i+\omega-1 & -1 \end{vmatrix} =$$

 [Watch Video Solution](#)

226. If

$$ax^{12} + by^{12} + cz^{12} = ax^{22} + by^{22} + cz^{22} = ax^{32} + by^{32} + cz^{32} = d, ax^{23} + by^{23} + cz^{23} = f,$$

then prove that $|x_1 y_1 z_1 x_2 y_2 z_2 x_3 y_3 z_3| = (d - f) \left\{ \frac{(d + 2f)}{abc} \right\}^{1/2}$

 [Watch Video Solution](#)

227. If $A, B,$ and C are the angles of triangle, show that the system of equations

$$x \sin 2A + y \sin C + z \sin B = 0, \sin C + y \sin 2B + z \sin A = 0, \text{ and } x \sin B + y \sin A + z \sin 2C = 0$$

posses nontrivial solution. Hence, system has infinite solutions.

 [Watch Video Solution](#)

228. Let α, β, γ are the real roots of the equation $x^3 + ax^2 + bx + c = 0$ ($a, b, c \in \mathbb{R}$ and $a \neq 0$). If the system of equations (u, v, w) given by $\alpha u + \beta v + \gamma w = 0$, $\beta u + \gamma v + \alpha w = 0$, $\gamma u + \alpha v + \beta w = 0$ has non-trivial solutions then the value of a^2/b is _____.



Watch Video Solution

229. If $a_1, a_2, a_3, 54, a_6, a_7, a_8, a_9$ are in H.P., and $D = \begin{vmatrix} a_1 & a_2 & a_3 & 54 & a_6 & a_7 & a_8 & a_9 \end{vmatrix}$, then the value of $[D]$ is where $[.]$ represents the greatest integer function



Watch Video Solution

230. If $f(x)$ is a polynomial of degree < 3 , prove that $\left| \frac{1af(a)/(x-a) + 1bf(b)/(x-b) + 1cf(c)/(x-c)}{1aa^2 + 1^2 + 2} \right| = \frac{f(x)}{(x-a)(x-b)(x-c)}$



Watch Video Solution

231. Prove that $|a - aa + - cb + ca - - c0a - cxyz1 + x + y| = 0$ implies that a, b, c are in A.P. or a, c, b are in G.P.

 [Watch Video Solution](#)

232. Solve for $x \in R$:

$$\begin{vmatrix} (x+a)(x-a) & (x+b)(x-b) & (x+c)(x-c) \\ (x-a)^3 & (x-b)^3 & (x-c)^3 \\ (x+a)^3 & (x+b)^3 & (x+c)^3 \end{vmatrix} = 0, a, b$$

and c being distinct real numbers.

 [Watch Video Solution](#)

233. Absolute value of sum of roots of the equation $|x + 22x + 33x + 42x + 33x + 44x + 53x + 55c + 810x + 17| = 0$ is _____.

 [Watch Video Solution](#)

234. Let α_1, α_2 and β_1, β_2 be the roots of the equation $ax^2 + bx + c = 0$ and $px^2 + qx + r = 0$ respectively. If the system of equations $\alpha_1 y + \alpha_2 z = 0$ and $\beta_1 y + \beta_2 z = 0$ has a non trivial solution then prove that $\frac{b^2}{q^2} = \frac{ac}{pr}$

 **Watch Video Solution**

235. The product of all values of t , for which the system of equations $(a - t)x + by + cz = 0, bx + (c - t)y + az = 0, cx + ay + (b - t)z = 0$ has non-trivial solution, is $|a - c - b - cb - a - b - ac|$ (b) $|abc bcacab|$ $|acaba|$ (d) $|aa + + c + + a + aa + b|$

 **Watch Video Solution**

236. Let $\omega = -\frac{1}{2} + i\frac{\sqrt{3}}{2}$. Then the value of the determinant

$$\begin{vmatrix} 1 & 1 & 1 \\ 1 & -1 - \omega^2 & \omega^2 \\ 1 & \omega^2 & \omega^4 \end{vmatrix} \text{ is (A) } 3\omega \text{ (B) } 3\omega(\omega - 1) \text{ (C) } 3\omega^2 \text{ (D) } 3\omega(1 - \omega)$$

 **Watch Video Solution**

 Watch Video Solution

237. If $f(x) = | -xa - xaab - x |$, then a factor is $a + b + x$
 $x^2 - (a - b) + x + a^2 + b^2 + ab$
 $x^2 - (a + b) + x + a^2 + b^2 - ab$
 $a + b - x$

 Watch Video Solution

238. If $g(x) = \left| a^{-x} e^{x \log_e a} x^2 a^{-3x} e^{3x \log_e a} x^4 a^{-5x} e^{5x \log_e a} 1 \right|$, then graphs of $g(x)$ is symmetrical about the origin graph of $g(x)$ is symmetrical about the y-

axis $\left(\frac{d^4 g(x)}{dx^4} \Big|_{x=0} = 0 \right)$ $f(x) = g(x) \times \log \left(\frac{a - x}{a + x} \right)$ is an odd function

 Watch Video Solution

239. the sum of values of p for which the equations $x+y+z=1$
 $x+2y+4z=p$ and $x+4y+10z=p^2$ have a solution is ____

 Watch Video Solution

240. The value of $|\alpha|$ for which the system of equation

$$\alpha x + y + z = \alpha - 1$$

$$x + \alpha y + z = \alpha - 1$$

$$x + y + \alpha z = \alpha - 1$$

has no solution, is _____

 [Watch Video Solution](#)

241. Let $D_1 = |aba + bc dc + daba - b|$ and $D_2 = |aca + cb db + dca + b + c|$

then the value of $\left| \frac{D_1}{D_2} \right|$, where $b \neq 0$ and $d \neq bc$, is _____.

 [Watch Video Solution](#)

242. Three distinct points $P(3u^2, 2u^3)$; $Q(3v^2, 2v^3)$ and $R(3w^2, 2w^3)$ are collinear then

 [Watch Video Solution](#)

243. If $|x + yx + y + z2x3x + 2y4x + 3y + 2z3x6x + 3y10x + 6y + 3z| = 64$, then the real value of x is _____.

 [Watch Video Solution](#)

244. If $\left| \frac{1}{3} \cos \theta \frac{1}{s} \int h \eta \frac{1}{3} \cos \theta \frac{1}{s} \int h \eta \right|$, then the value of $(\text{max})/2$

 [Watch Video Solution](#)

245. _____ if

$$\left| x^n x^{n+2} x^{n+4} y^n y^{n+2} y^{n+4} z^n z^{n+2} z^{n+4} \right| = \left(\frac{1}{y^2} - \frac{1}{x^2} \right) \left(\frac{1}{z^2} - \frac{1}{y^2} \right) \left(\frac{1}{x^2} - \frac{1}{z^2} \right)$$

then n is _____.

 [Watch Video Solution](#)

246. The value of

$$\left| 2x_1y_1x_1y_2 + x_2y_1x_1y_3 + x_3y_1x_1y_2 + x_2y_1^2x_2y_2x_2y_3 + x_3y_2x_1y_3 + x_3y_1x_2y_3 + x_3y_2^2 \right|$$

is.



[Watch Video Solution](#)

247. Given $A = |ab2cde2flm2n|$, $B = |f2de2n4l2mc2ab|$, then the value of

B/A is _____.



[Watch Video Solution](#)

Question Bank

1. Number of real roots of the equation

$$|[1, x, x], [x, 1, x], [x, x, 1]| + |[1 - x, 1, 1], [1, 1 - x, 1], [1, 1, 1 - x]| = 0 \text{ is}$$



[View Text Solution](#)

2. If
$$\begin{vmatrix} \sqrt{3}x - x^2 & x - 1 & x - \sqrt{3} \\ \sqrt{3}x & x & \sqrt{3} - 1 \\ x - 1 & \sqrt{3} - x & x - 1 \end{vmatrix} = ax^4 + bx^3 + cx^2 + dx + e$$
 and

$a + c = p + \sqrt{q}$, then $(p - q)$ is equal to

 [View Text Solution](#)

3. If

$$f(x) = |\cos(x + \alpha), \cos(x + \beta), \cos(x + \gamma)|, [\sin(x + \alpha), \sin(x + \beta), \sin(x + \gamma)], [\sin(x + \alpha), \sin(x + \beta), \sin(x + \gamma)]$$

and

$$f(0) = -2 \text{ then } \sum_{r=1}^{30} |f(r)| \text{ equals}$$

 [View Text Solution](#)

4. If the equations $px + 2y - 3 = 0$, $x + 3y - 4 = 0$ and

$$px^2 + 3y^2 + 3xy + (q - 3)x - 3y - 1 = 0 (p \neq 23)$$
 has a unique solution then

find the value of $(p + q)$.

 [View Text Solution](#)

5. Let $f(x) = \begin{vmatrix} 1 + \sin^2 x & \cos^2 x & 4\sin 2x \\ \sin^2 x & 1 + \cos^2 x & 4\sin 2x \\ \sin^2 x & \cos^2 x & 1 + 4\sin 2x \end{vmatrix}$, the maximum value of $f(x)$

is

 [View Text Solution](#)

6. Given $2x - y + 2z = 1$, $x - 2y + z = -4$, and $x + y + \lambda z = 4$. Then the value of λ such that the given system of equation has no solution is

 [View Text Solution](#)

7. If M and m are maximum and minimum value, respectively of

$\begin{vmatrix} 1 & \cos\theta & 1 \\ \cos\theta & 1 & \cos\theta \\ -1 & \cos\theta & 1 \end{vmatrix}$, then value of $(M + m)$ is

 [View Text Solution](#)

8. The value of $\begin{vmatrix} \log_3 512 & \log_4 3 \\ \log_3 8 & \log_4 9 \end{vmatrix} \begin{vmatrix} \log_2 3 & \log_8 3 \\ \log_3 4 & \log_3 4 \end{vmatrix}$ is

 [View Text Solution](#)

9. If $x \in \left[0, \frac{\pi}{2}\right]$ such that $\left|(\sin x + \cos x) - \sqrt{2}\right| + \left|y + \frac{1}{y} - 2\right| + |z| \leq 0$, then the value of

$[\sin 4x, \cos^2 x, 1], [y+2, y^3, (1/y)], [\ln(z+1), z+5, z^3+2]$ is

 [View Text Solution](#)

10. If α, β, γ are roots of the equation $x^3 + x^2 + 2x - 4 = 0$, then value of

$\begin{vmatrix} 1 + \alpha & 1 & 1 \\ 1 & 4 - \beta^3 & 1 \\ 1 & 1 & 4 - \gamma^3 \end{vmatrix}$ (where α is real)

 [View Text Solution](#)

11. If p and q are real so that system of equations $px + 4y + z = 0$, $2y + 3z = 1$ and $3x - qz = -2$ has infinite solution, then $\sqrt{q^2 - p^2}$ is equal to

 [View Text Solution](#)

12. If $|\begin{bmatrix} 1 & x & x^2 \\ x & x^2 & 1 \\ x^2 & 1 & x \end{bmatrix}| = 3$, then the value of $|\begin{bmatrix} x^3 - 1 & 0 & x - x^4 \\ 0 & x - x^4 & x^3 - 1 \\ x - x^4 & x^3 - 1 & 0 \end{bmatrix}|$

 [View Text Solution](#)

13. Let $f(x) = \begin{vmatrix} x & 1 & -\frac{3}{2} \\ 2 & 2 & 1 \\ \frac{1}{x-1} & 0 & \frac{1}{2} \end{vmatrix}$. The minimum value of $f(x)$ (given $x > 1$) is

 [View Text Solution](#)

14. In the determinant, $\Delta = \begin{vmatrix} -2 & 5 & -1 \\ 4 & 7 & 0 \\ 5 & -3 & 1 \end{vmatrix}$, the absolute value of sum of the

minors of elements of third row is

 [View Text Solution](#)

15. If $[[x^2, x^4, (x-1)^2], [0, 4, 6x^2], [4, 1, 7]] = \text{overset}(6) \text{underset}(1 = 0)$ sum $a_i x$, then $|a_0| + |a_6|$ is equal to

 [View Text Solution](#)

16. If a, b, c are the sides of a scalene triangle such that $[[a, a^2, a^{(3)-1}], [b, b^2, b^{(3)-1}], [c, c^2, c^{(3)-1}]] = 0$, then the \geq *ometric mean* of a, b, c is

 [View Text Solution](#)

17. Number of real roots of the equation $\begin{vmatrix} \sin x & x \\ 1 & 1 \end{vmatrix} \begin{vmatrix} \cos x \\ x & 1 \end{vmatrix} = 0$

 [View Text Solution](#)

18. Let $a + b + c = s$ and $[[s+c, a, b],[c, s+a, b],[c, a, s+b]]$ is equal to 54 then the value of s is

 [View Text Solution](#)

19. In triangle ABC , if $\begin{vmatrix} 1 & a & b \\ 1 & c & a \\ 1 & b & c \end{vmatrix} = 0$ then the value of $\sin^2 A + \cos^2 B + \tan^2 C$ is equal to

 [View Text Solution](#)

20. If system of linear equations $(a - 1)x + z = \alpha_1 x + (b - 1)y = \beta$ and $y + (c - 1)z = \gamma$ where $a, b, c \in I$ does not have a unique solution, then maximum possible value of $|a + b \div c|$ is

 [View Text Solution](#)

21. If $a_1, a_2, a_3, 5, 4, a_6, a_7, a_8, a_9$ are in $H.P$, then the value of the

determinant $\begin{vmatrix} a_1 & a_2 & a_3 \\ 5 & 4 & a_6 \\ a_7 & a_8 & a_9 \end{vmatrix}$ can be expressed in the lowest form as $\frac{p}{q}$, find

$(p + q)$

 [View Text Solution](#)

22. If $0 \leq [x] < 2$, $-1 \leq [y] < 1$ and $1 \leq [z] < 3$ where $[.]$ denotes greatest integral function then the maximum value of the determinant.

$D = \begin{vmatrix} [x] + 1 & [y] & [z] \\ [x] & [y] + 1 & [z] \\ [x] & [y] & [z] + 1 \end{vmatrix}$ is

 [View Text Solution](#)

23. If $f(x) = \tan x$ and A, B, C are the angles of $\triangle ABC$, then

$$\begin{vmatrix} f(A) & f\left(\frac{\pi}{4}\right) & f\left(\frac{\pi}{4}\right) \\ f\left(\frac{\pi}{4}\right) & f(B) & f\left(\frac{\pi}{4}\right) \\ f\left(\frac{\pi}{4}\right) & f\left(\frac{\pi}{4}\right) & f(C) \end{vmatrix} =$$



[View Text Solution](#)