MATHS

BOOKS - KC SINHA ENGLISH

DETERMINANTS - FOR COMPETITION

Solved Examples

1. For a fixed positive integer n, if

$= |n!(n+1)!(n+2)!(n+1)!(n+2)!(n+3)!(n+2)!(n+3)!(n+4)!$

, then show that $\left[/\left((n!)^3\right)-4\right]$ is divisible by n.

Watch Video Solution

2. If $y = \frac{u}{v}$, where u & v are functions of 'x' show that $v^3 \frac{d^2y}{dx^2}$=

$$\begin{vmatrix} u & v & 0 \\ u' & v' & v \\ u' & v' & 2v' \end{vmatrix}$$

Watch Video Solution

3. Show that the value of a third order determinant whose all elements are 1 or -1 is an even number.

Watch Video Solution

4. Prove that:

$$\begin{vmatrix} \sin\alpha & \cos\alpha & 1 \\ \sin\beta & \cos\beta & 1 \\ \sin\gamma & \cos\gamma & 1 \end{vmatrix} = \sin(\alpha - \beta) + \sin(\beta - \gamma) + \sin(\gamma - \alpha)$$

Watch Video Solution

5. If $f(x) = \begin{vmatrix} x^n & \sin x & \cos x \\ n! & \sin\left(\frac{n\pi}{2}\right) & \cos\left(\frac{n\pi}{2}\right) \\ a & a^2 & a^3 \end{vmatrix}$, then show that $\frac{d^n}{dx^n}[f(x)]$ at x=0` is 0

Watch Video Solution

6. If α, β be the real roots of $ax^2 + bx + c = 0$, and $s_n = \alpha^n + \beta^n$ then prove that $as_n + bs_{n-1} + cs_{n-2} = 0$.for all $n \in N$.

Watch Video Solution

7. for what values of p and q the system of equations $2x + py + 6z = 8x + 2y + qz = 5, x + y + 3z = 4$ has

(i) no solutions

(ii) a unique solution

(iii) infinitely many solution.

Watch Video Solution

8. If $\begin{vmatrix} x^k & x^{k+2} & x^{k+3} \\ y^k & y^{k+2} & y^{k+3} \\ z^k & z^{k+2} & z^{k+3} \end{vmatrix} = (x-y)(y-z)(z-x)\left(\frac{1}{x}+\frac{1}{y}+\frac{1}{z}\right)$

then find the value of k.

Watch Video Solution

9. 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

10. about to only mathematics

Watch Video Solution

11. If α, β and γ are such that $\alpha + \beta + \gamma = 0$, then

$$\begin{vmatrix} 1 & \cos\gamma & \cos\beta \\ \cos\gamma & 1 & \cos\alpha \\ \cos\beta & \cos\alpha & 1 \end{vmatrix}$$

Watch Video Solution

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

$|31 + f(1)1 + f(2)1 + f(1)1 + f(2)1 + f(3)1 + f(2)1 + f(3)1 + f(4)| =$

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

Watch Video Solution

13. If $p(x), q(x)$ and $r(x)$ be polynomials of degree one and a_1, a_2, a_3 be real numbers then $\begin{vmatrix} p(a_1) & p(a_2) & p(a_3) \\ q(a_1) & q(a_2) & q(a_3) \\ r(a_1) & r(a_2) & r(a_3) \end{vmatrix} =$ (A) 0 (B) 1 (C) -1 (D) none of these

Watch Video Solution

14. If $a, \ b, \ c$ are non-zero real numbers and if the system of equations $(a-1)x = y+z, \ \ (b-1)y = z+x, \ \ (c-1)z = x+y$ has a non-trivial solution, then prove that $ab+bc+ca = ab \cdot$

Watch Video Solution

15. The value of theta lying between 0 and $\frac{\pi}{2}$ and satisfying the equation $\left|\left(1+\cos^2\theta, \sin^2\theta, 4\sin 4\theta\right), \left(\cos^2\theta, 1+\sin^2\theta, 4\sin 4\theta\right)\left(\cos^2\theta, \sin^2\theta, 1+\right.\right.$ is (are)

Watch Video Solution

16. If x,y and y are not all zero and if

ax+by+cz=0,bx+cy+az=0

and cx+ay+bz=0, then

prove that x:y:z=1:1:1 or $1:\omega:\omega^2 \mathrm{or} 1:\omega^2:\omega$

Watch Video Solution

17. If $f_r(x), g_r(x), h_r(x), r = 1, 2, 3$ are polynomials such that $f_r(a) = g_r(a) = h_r(a), r = 1, 2, 3$ and

$$F(x) = \begin{vmatrix} f_1(x) & f_2(x) & f_3(x) \\ g_1(x) & g_2(x) & g_3(x) \\ h_1(x) & h_2(x) & h_3(x) \end{vmatrix}$$ then $F'(x) at x = a$ is________________

Watch Video Solution

18. Let $f(x) = \begin{vmatrix} x^4 & \cos x & \sin x \\ 24 & 0 & 1 \\ a & a^2 & a^3 \end{vmatrix}$, where a is a constant Then at $x = \frac{\pi}{2}, \frac{d^4}{dx^4}\{f(x)\}$ is

(A) 0 (B) a (C) $a + a^3$ (D) $a + a^4$

Watch Video Solution

19. 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(2)=6, then find $\frac{1}{5}\sum_{r=1}^{25} f(r)$,

Watch Video Solution

20. If $\begin{vmatrix} x & x+y & x+y+z \\ 2x & 3x+2y & 4x+3y+2z \\ 3x & 6x+3y & 10x+6y+3z \end{vmatrix} = 64$ then the real value of x is

______

Watch Video Solution

21. If Y=sX and Z =tX all the varibles beings functions of x then prove that

$$\begin{vmatrix} X & Y & Z \\ X_1 & Y_1 & Z_1 \\ X_2 & Y_2 & Z_2 \end{vmatrix} = X^3 \begin{vmatrix} s_1 & t_1 \\ s_2 & t_2 \end{vmatrix}$$

where suffixes denote the order of differention with respect to x.

Watch Video Solution

Exercise

1. Using properties of determinant prove that $\begin{vmatrix} a^2+1 & ab & ac \\ ab & b^2+1 & bc \\ ca & cb & c^2+1 \end{vmatrix} = (1+a^2+b^2+c^2).$

Watch Video Solution

2. Evaluate: $\triangle \begin{vmatrix} 1+a_1 & a_2 & a_3 \\ a_1 & 1+a_2 & a_3 \\ a_1 & a_2 & 1+a_3 \end{vmatrix}$

Watch Video Solution

3. The value of $\begin{vmatrix} a-b & b+c & a \\ b-a & c+a & b \\ c-a & a+b & c \end{vmatrix}$ is

Watch Video Solution

4. Prove that:

$\left|(b+c)^2 a^2 a^2 b^2 (c+a)^2 b^2 c^2 c^2 (a+b)^2\right| = 2abc(a+b+c)^2$

Watch Video Solution

5. If $p+q+r=0$ and $\begin{vmatrix} pa & qb & rc \\ qc & ra & pb \\ rb & pc & qa \end{vmatrix} = \lambda \begin{vmatrix} a & b & c \\ c & a & b \\ b & c & a \end{vmatrix}$ then $\lambda =$

Watch Video Solution

6. Without expanding a determinant at any stage, show that $\begin{vmatrix} x^2+x & x+1 & x-2 \\ 2x^2+3x-1 & 3x & 3x-3 \\ x^2+2x+3 & 2x-1 & 2x-1 \end{vmatrix} = xA+B$,where A and B are determinant of order 3 not involving x.

Watch Video Solution

7. If $f, g, and\ h$ are differentiable functions of x and $d(x) = \begin{vmatrix} f & g & h \\ (xf)' & (xg)' & (xh)' \\ (x^2 f)'' & (x^2 g)'' & (x^2 h)'' \end{vmatrix}$ prove that $d'(x) = \begin{vmatrix} f & g & h \\ f' & g' & h' \\ (x^3 f'')' & (x^3 g'')' & (x^3 h'')' \end{vmatrix}$

Watch Video Solution

8. Let $\lambda and \alpha$ be real. Find the set of all values of λ for which the system of linear equations $\lambda x + (\sin\alpha)y + (\cos\alpha)z = 0, x + (\sin\alpha)y - (\cos\alpha)z = 0, \ - x + (\sin\alpha)y$

has a non-trivial solution is

Watch Video Solution

9. Show that if $x_1, x_2, x_3 \neq 0$ $|x_1 + a_1 b1 a_1 b_2 a_1 b_3 a_2 b_1 x_2 + a_2 b_2 a_2 b_3 a_3 b_1 a_3 b_2 x_3 + a_3 b_3| = x_1 x_2 x_3 \left(1 + \frac{a_1}{x}\right.$

.

Watch Video Solution

10. If $y = \sin px$ and y_n is the nth derivative of y, then $\begin{vmatrix} y & y_1 & y_2 \\ y_3 & y_4 & y_5 \\ y_6 & y_7 & y_8 \end{vmatrix} is$

(a)1 (b) 0 (c) -1 (d) none of these

Watch Video Solution

11. If f(a,b) $= \dfrac{f(b)-f(a)}{b-a}$ and $f(a,b,c) = \dfrac{f(b,c)-f(a,b)}{c-a}$ prove that $f(a,b,c) = \begin{vmatrix} f(a) & f(b) & f(c) \\ 1 & 1 & 1 \\ a & b & c \end{vmatrix} \div \begin{vmatrix} 1 & 1 & 1 \\ a & b & c \\ a^2 & b^2 & c^2 \end{vmatrix}$.

Watch Video Solution

12. about to only mathematics

Watch Video Solution

13. If $\text{Delta}_r = \begin{vmatrix} 2^{r-1} & 2.\ 3^{r-1} & 4.\ 5^{r-1} \\ x & y & z \\ 2^n-1 & 3^n-1 & 5^n-1 \end{vmatrix}$ Show that $\sum_{r=1}^{n} \text{Delta}_r$= Constant

Watch Video Solution

14. the value of

$$Simga_{r=2}^{n}(-2)^r \begin{vmatrix} .^{n-2}C_{r-2} & .^{n-2}C_{r-1} & .^{n-2}C_r \\ -3 & 1 & 1 \\ 2 & -1 & 0 \end{vmatrix} (n>2)$$

Watch Video Solution

15. Prove that $\begin{vmatrix} a_1\alpha_1+b_1\beta_1 & a_1\alpha_2+b_1\beta_2 & a_1\alpha_3+b_1\beta_3 \\ a_2\alpha_1+b_2\beta_1 & a_2\alpha_2+b_2\beta_2 & a_2\alpha_3+b_2\beta_3 \\ a_3\alpha_1+b_3\beta_1 & a_3\alpha_2+b_3\beta_2 & a_3\alpha_3+b_3\beta_3 \end{vmatrix} = 0$

Watch Video Solution

16. Determine for that values of λ and μ the following system of equations

$x+y+xz=6, x+2y+43z=10$ and x+2y+lambdaz=mu` have (i) no solution (iii) a unique solution ? (iii) an infine number of solution?

Watch Video Solution

17. if $bc + qr = ca + rp = ab + pq = -1$ then prove that

$$\begin{vmatrix} ap & a & p \\ bq & b & q \\ cr & c & r \end{vmatrix} = 0$$

Watch Video Solution

18. 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 a.0 b. 1 c.-1 d. none of these

Watch Video Solution

19. Consider the system linear equations in $x, y, andz$ given by $(s \in 3\theta)x - y + z = 0, (\cos 2\theta)x + 4y + 3z = 0, 2x + 7y + 7z = 0.$

Find the value of θ for which the system has a non-trivial solution.

Watch Video Solution

20. If the system of equations, $x + 2y - 3z = 1, (k+3)z = 3, (2k+1)x + z = 0$ is inconsistent, then the value of k is (A) -3 (B) $\frac{1}{2}$ (C) 0 (D) 2

Watch Video Solution

21. The value of the determinant $\begin{vmatrix} x & x+a & x+2a \\ x & x+2a & x+4a \\ x & x+3a & x+6a \end{vmatrix}$ is (A) 0 (B) $a^3 - x^3$ (C) $x^3 - a^3$ (D) $(x-a)^3$

Watch Video Solution

22. Value of the determinant $\begin{vmatrix} x & 1 & 1 \\ 0 & 1+x & 1 \\ -y & 1+x & 1+y \end{vmatrix}$ is (A) xy (B) $xy(x+2)$ (C) $x(x+1)(y+1)$ (D) $xy(x+1)$

Watch Video Solution

23. If each element of as third order determinant of value $\triangle$ is multiplied by 5 then value of the new determinant is

(A) $125 \triangle$ B) $25 \triangle$ (C)$5 \triangle$ (D) $\triangle$

Watch Video Solution

24. In a third order determinant, each element of the first column consists of sum oftwo terms, each element of the second column consists of sum of three terms and each element of the third column consits of sum of four terms, Then it can be decomposed into four terms,.Then it can be decomposed into n determinants, where n has value

Watch Video Solution

25. One root of the equation $\begin{vmatrix} 3-x & -6 & 3 \\ -6 & 3-x & 3 \\ 3 & 3 & -6-x \end{vmatrix} = 0 \quad is:$

Watch Video Solution

26. $\begin{vmatrix} a_1 & b_1 & c_1 \\ a_2 & b_2 & c_2 \\ a_3 & b_3 & c_3 \end{vmatrix} = 0$ then the system of equations $a_1x + b_1y + c_1z = 0, a_2x + b_2y + c_2z = 0, a_3x + b_3y + c_3z = 0$ has

Watch Video Solution

27. $\begin{vmatrix} a_1 & b_1 & c_1 \\ a_2 & b_2 & c_2 \\ a_3 & b_3 & c_3 \end{vmatrix} = 0$ then the system of equations $a_1x + b_1y + c_1z = 0, a_2x + b_2y + c_2z = 0, a_3x + b_3y + c_3z = 0$ has

Watch Video Solution

28. If the value of a third order determinant is 11, find the value of the square of the determinat formed by the cofactors.

Watch Video Solution

29. Let $f(x) = \begin{vmatrix} x^3 & \sin x & \cos x \\ 6 & -1 & 0 \\ p & p^2 & p^3 \end{vmatrix}$, where p is constant. Then, find $\frac{d^3}{dx^3}[f(x)]$ at $x = 0$

Watch Video Solution

30. If $f(x) = |(1, x, x+1), (2x, x(x-1), (x+1)x, 3x(x-1), x(x-1)(x-2$

is equal to (A) 0 (B) 1 (C) 100 (D) -100

Watch Video Solution

31. 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 a.$-1, 2$ b. $1, 2$ c. $0, 1$ d. $-1, 1$

Watch Video Solution

32. The number of solution of the following equations $x_2 - x_3 = 1, \ - x_1 + 2x_3 = \ - 2, x_1 - 2x_2 = 3$ is

Watch Video Solution

33. Without expanding show that $\left|b^2c^2bcb + \hat{\ } 2a^2cac + aa^2b^2aba + b\right| = 0$

Watch Video Solution

34. The number of distinct real roots of $\left|\sin x \cos x \cos x \cos x \sin x \cos x \cos x \cos x \sin x\right| = 0$ in the interval $- \frac{\pi}{4} \leq x \leq \frac{\pi}{4}$ is 0 (b) 2 (c) 1 (d) 3

Watch Video Solution

35. The value of the determinant $\begin{vmatrix} 1 & a & a^2 - bc \\ 1 & b & b^2 - ca \\ 1 & c & c^2 - ab \end{vmatrix}$ is ___

Watch Video Solution

36. One root of the equation $\begin{vmatrix} 3x-8 & 3 & 3 \\ 3 & 3x-8 & 3 \\ 3 & 3 & 3x-8 \end{vmatrix} = 0si(A)$8/3

(B)2/3(C)1/3(D)16/3`

Watch Video Solution

37. If $\_r = |2^r 2.3^r - 14.5^r - 1\alpha\beta\gamma 2^n - 13^n - 15^n - 1|$, then find the value of $\cdot$

A. 0

B. alpha beta gamma

C. alpha+beta+gamma

D. `alpha.2^n+beta.3^n+gamma.5^n

Answer: null

Watch Video Solution

38. about to only mathematics

Watch Video Solution

39. The three roots of the equation $\begin{vmatrix} x & 3 & 7 \\ 2 & x & 2 \\ 7 & 6 & x \end{vmatrix}$=0 are

Watch Video Solution

40. 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

Watch Video Solution

41. Prove that:

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

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

(iii) $\begin{vmatrix} b+c & a & a \\ b & c+a & b \\ c & c & a+b \end{vmatrix} = 4abc$

(iv) If $\begin{vmatrix} 1 & a^2 & a^4 \\ 1 & b^2 & b^4 \\ 1 & c^2 & c^4 \end{vmatrix} = (a+b)(b+c)(c+a) = \begin{vmatrix} 1 & 1 & 1 \\ a & b & c \\ a^2 & b^2 & c^2 \end{vmatrix}$

Watch Video Solution

42. If a, b, c are unequal then what is the condition that the value of the following determinant is zero $\Delta = \begin{vmatrix} a & a^2 & a^3+1 \\ b & b^2 & b^3+1 \\ c & c^2 & c^3+1 \end{vmatrix}$

Watch Video Solution

43. Prove: $\begin{vmatrix} b+c & a & a \\ b & c+a & b \\ c & c & a+b \end{vmatrix} = 4abc$

Watch Video Solution

44. If $a_1, a_2, a_3, \ldots\ldots\ldots\ldots a_{12}$ are in A.P. and $\triangle_1 = \begin{vmatrix} a_1a_5 & a_1 & a_2 \\ a_2a_6 & a_2 & a_3 \\ a_3a_7 & a_3 & a_4 \end{vmatrix}, \triangle_2 = \begin{vmatrix} a_2a_{10} & a_2 & a_3 \\ a_3a_{11} & a_3 & a_4 \\ a_4a_{12} & a_4 & a_5 \end{vmatrix} then\ \triangle_1 : \triangle_2 =$

$(A) 1:2$

$(B) 2:1$

$(C) 1:1$

(D) none of these

Watch Video Solution

45. If $\begin{vmatrix} x & -2 & 10 \\ -2 & x & 10 \\ 10 & -2 & x \end{vmatrix} = 0$ then

(A) $x = 7$ (B) $x = -4$ (C) $x = -8$ (D) $x = 0$

Watch Video Solution

46. If $\begin{vmatrix} x^n & x^{n+2} & x^{n+4} \\ y^n & y^{n+2} & y^{n+4} \\ z^n & z^{n+2} & z^{n+4} \end{vmatrix} = \left(\frac{1}{y^2} - \frac{1}{x^2}\right)\left(\frac{1}{z^2} - \frac{1}{y^2}\right)\left(\frac{1}{x^2} - \frac{1}{z^2}\right)$

then n is ________.

Watch Video Solution

47. If ω is a cube root of unity, then $\begin{vmatrix} 1-i & \omega^2 & -\omega \\ \omega^2+i & \omega & -i \\ 1-2i-\omega^2 & \omega^2-\omega & i-\omega \end{vmatrix}$ =

A. (A) -1

B. (B) i

C. (C) ω

D. (D) 0

Answer: null

Watch Video Solution

48. If $a \neq b \neq c$, then solution of equation

$$\begin{vmatrix} x-a & x-b & x-c \\ x-b & x-c & x-a \\ x-c & x-a & x-b \end{vmatrix} = 0 \quad is:$$

Watch Video Solution

49. For the system of equations $x+y+z=4, y+2z=5$ and $x+y+pz=q$ to have no solution (A) $p=1$ and $q=4$ (B) $p=1$ and $q \neq 4$ (C) $p \neq 1$ and $q=4$ (D) $p \neq 1$ and $q \neq 4$

Watch Video Solution

50. If $=\left|abcb^2 \hat{} \ 2bab \hat{} \ 2aca^2abca^2 \hat{} \ 2a\right|=0, (a, b, c \in R$ and are all different and nonzero), then prove that $a+b+c=0$.

Watch Video Solution

51. If $\left(1+ax+bx^2\right)^4 = a_0 + a_1x + a_2x^2 + \ldots + a_8x^8, where a, b, a_0, a_1, , a_8 \in$ such that $a_0+a_1+a_2 \neq 0$and $\begin{vmatrix} a_0 & a_1 & a_2 \\ a_1 & a_2 & a_0 \\ a_2 & a_0 & a_1 \end{vmatrix} = 0$, then the value of $5\frac{a}{b}$ is ______.

Watch Video Solution

52. If a,b,c be the pth, qth and rth terms respectively of a H.P., the $\begin{vmatrix} bc & p & 1 \\ ca & q & 1 \\ ab & r & 1 \end{vmatrix} =$ (A) 0 (B) 1 (C) -1 (D) none of these

Watch Video Solution

53. The determinant $D = \begin{vmatrix} \cos(\alpha+\beta) & -\sin(\alpha+\beta) & \cos 2\beta \\ \sin\alpha & \cos\alpha & \sin\beta \\ -\cos\alpha & \sin\alpha & \cos\beta \end{vmatrix}$ is independent of :-

Watch Video Solution

54. If $a_1, a_2, a_3, \ldots.\, a_n \ldots$ are in G.P. then the determinant 'Delta=|[loga_n , loga_(n+1),loga_(n+2)],[loga_(n+3),loga_(n+4),loga_(n+5)],[loga_(n+6),loga_(n+7),loga_(n+8)]|` is equal to- (A) -2 (B) 1 (C) -1 (D) 0

Watch Video Solution

55. If $\begin{vmatrix} x & x+y & x+y+z \\ 2x & 3x+2y & 4x+3y+2z \\ 3x & 6x+3y & 10x+6y+3z \end{vmatrix} = 64,$ then the real value of x is __________.

Watch Video Solution

56. Given $A = \begin{vmatrix} a & b & 2c \\ d & e & 2f \\ l & m & 2n \end{vmatrix}, B = \begin{vmatrix} f & 2d & e \\ 2n & 4l & 2m \\ c & 2a & b \end{vmatrix}$, then the value of B/A is __________.

Watch Video Solution

57. Using properties of determinats prove that :

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

Watch Video Solution

58. $\begin{vmatrix} ax+y & x & y \\ ay+1 & y & 1 \\ 0 & ax+y & ay+1 \end{vmatrix} = 0 where a^2x+2ay+1 \neq 0$ represents

(A) a straight line (B) a circle (C) a parabola (D) none of these

Watch Video Solution

59. 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 then the value of n is

Watch Video Solution

60. If $\alpha_r = (\cos 2r\pi + i\sin 2r\pi)^{\frac{1}{10}}$, then $\begin{vmatrix} \alpha_1 & \alpha_2 & \alpha_4 \\ \alpha_2 & \alpha_3 & \alpha_5 \\ \alpha_3 & \alpha_4 & \alpha_6 \end{vmatrix} =$ (A) α_5 (B) α_7

(C) `0 (D) none of these

Watch Video Solution

61. If $f(x) = \tan x$ and A, B, C are the anlges of $\triangle ABC, then \begin{vmatrix} f(A) & f\left(\frac{\pi}{4}\right) f\left(\frac{\pi}{4}\right) \\ f\left(\frac{\pi}{4}\right) & f(B) f\left(\frac{\pi}{4}\right) \\ f\left(\frac{\pi}{4}\right) & f\left(\frac{\pi}{4}\right) f(C) \end{vmatrix}$ = (A) 0 (B) -2 (C) 2 (D) 1

Watch Video Solution

62. If $|pbcaqcabr| = 0$, find the value of $\frac{p}{p-a} + \frac{q}{q-b} + \frac{r}{r-c}, \ p \neq a, \ \ q = b, \ \ r \neq c$

Watch Video Solution

63. Without expanding or evaluating show that $\begin{vmatrix} 0 & b-a & c-a \\ a-b & 0 & c-b \\ a-c & b-c & 0 \end{vmatrix} = 0$.

Watch Video Solution

64. If $a, b, c, d > 0, x \in R$ and $(a^2 + b^2 + c^2)x^2 - 2(ab + bc + cd)x + b^2 + c^2 + d^2 \leq 0$ then, $\begin{vmatrix} 1 & 1 & \log a \\ 1 & 2 & \log b \\ 1 & 3 & \log c \end{vmatrix} =$

Watch Video Solution

65. If $\sum_{n=1}^{n} u_n = an^2 + bn + c, then \begin{vmatrix} u_1 & u_2 & u_3 \\ 1 & 1 & 1 \\ 7 & 8 & 9 \end{vmatrix} =$

(A) 0 (B) $u_1 - u_2 + u_3$ (C) 1 (D) none of these

Watch Video Solution

66. If $\sum_{n=1}^{n} \alpha_n = an^2 + bn, wherea, b$ are constants and $\alpha_1, \alpha_2\alpha_3 \in \{12, 39\}and25\alpha_{137}\alpha_2, 49\alpha_3$ 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

67. Prove that $a \neq 0, \begin{vmatrix} x+a & x & x \\ x & x+a & x \\ x & x & x+a^2 \end{vmatrix} = 0$ represents a straight line parallel to the y-axis.

Watch Video Solution

68. If $f_r(x), g_r(x), h_r(x), r = 1, 2, 3$ are polynomials such that $f_r(a) = g_r(a) = h_r(a), r = 1, 2, 3$ and

$F(x) = \begin{vmatrix} f_1(x) & f_2(x) & f_3(x) \\ g_1(x) & g_2(x) & g_3(x) \\ h_1(x) & h_2(x) & h_3(x) \end{vmatrix}$ then $F'(x) at x = a$ is__________________

Watch Video Solution

69. If f(x) = $\begin{vmatrix} \cos(x+\alpha) & \cos(x+\beta) & \cos(x+\gamma) \\ \sin(x+\alpha) & \sin(x+\beta) & \sin(x+\gamma) \\ \sin(\beta+\gamma) & \sin(\gamma+\alpha) & \sin(\alpha+\beta) \end{vmatrix}$ then $f(\theta) - 2f(\phi) + f(\psi)$ is equal to

Watch Video Solution

70. The value of $\begin{vmatrix} 2x_1y_1 & x_1y_2 + x_2y_1 & x_1y_3 + x_3y_1 \\ x_1y_2 + x_2y_1 & 2x_2y_2 & x_2y_3 + x_3y_2 \\ x_1y_3 + x_3y_1 & x_2y_3 + x_3y_2 & 2x_3y_3 \end{vmatrix}$ is.

Watch Video Solution

71. Let

$g(x)\left|f(x+c)f(x+2c)f(x+3c)f(c)f(2c)f(3c)f'(c)f'(2c)f'(3c)\right|,$

where c is constant, then find $(\lim)_{x \to 0} \frac{g(x)}{x}$

Watch Video Solution

72. 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 find A and B

Watch Video Solution

73. Let $f(x) = ax^2 + bx + c$, $a, b, c, \in R$ and equation $f(x) - x = 0$ has imaginary roots α, β. If r, s be the roots of $f(f(x)) - x = 0$, then $\begin{vmatrix} 2 & \alpha & \delta \\ \beta & 0 & \alpha \\ \gamma & \beta & 1 \end{vmatrix}$ is

Watch Video Solution

74. IF $ax^3 + bx^2 + cx + d$= $\begin{vmatrix} x^2 & (x-1)^2 & (x-2)^2 \\ (x-1)^2 & (x-2)^2 & (x-3)^2 \\ (x-2)^2 & (x-3)^2 & (x-4)^2 \end{vmatrix}$, then d=

(A) 1 (B) -8 (C) 0 (D) none of these

Watch Video Solution

75. The value of $\begin{vmatrix} \cos(x-a) & \cos(x+a) & \cos x \\ \sin(x+a) & \sin(x-a) & \sin x \\ \cos a \tan x & \cos a \cot x & \cos ec2x \end{vmatrix} =$ (A) 1 (B) $\sin a \cos a$ (C) $0(D)$sinx cosx`

Watch Video Solution

76. Choose any 9 distinct integers. These 9 integers cn be arrnanged to form 9! Determinants each of order 3. Then sum of these 9! Determinants is (A) 0 (B) 3! (C) lt0 (D) 9!

Watch Video Solution

77. The determinant $\Delta = \begin{vmatrix} a^2(a+b) & ab & ac \\ ab & b^2(a+k) & bc \\ ac & bc & c^2(1+k) \end{vmatrix}$ is divisible by

A. a^2

B. b^2

C. c^2

D. None of these

Answer: null

Watch Video Solution

78. If a,b,c are in G.P. then the value of $\begin{vmatrix} a & b & a+b \\ b & c & b+c \\ a+b & b+c & 0 \end{vmatrix} =$ (A) 1 (B) -1 (C) $a+b+c$ (D) 0

Watch Video Solution

79. If $z = \begin{vmatrix} 1+i & 5+2i & 3-2i \\ 7i & -3i & 5i \\ 1-i & 5-2i & 3+2i \end{vmatrix}$ then (A) z is purel imaginary (B) z is purely real (C) z has equal real and imaginary parts (D) z has positive real and imaginary parts.

Watch Video Solution

80. $\begin{vmatrix} 3 & -3i & x \\ 4 & y & i \\ 0 & 2i & -i \end{vmatrix} = 18 + 11i$ is true of (A) $x = 1, y = 2$ (B) $x = 1, y = -1$ (C) $x = -1, y = 1$ (D) $x = 0, y = 3$

Watch Video Solution

81. If α, β, γ are roots of the equation $x^2(px+q) = r(x+1)$, then the value of determinant $\begin{vmatrix} 1+\alpha & 1 & 1 \\ 1 & 1+\beta & 1 \\ 1 & 1 & 1+\gamma \end{vmatrix}$ is

Watch Video Solution

82. If $y = \sin\theta + \sqrt{3}\cos\theta$ and $\begin{vmatrix} 1+y & 1-y & 1-y \\ 1-y & 1+y & 1-y \\ 1-y & 1-y & 1+y \end{vmatrix} = 0$ the number of solution in $[0, 2\pi]$ is (A) one (B) two (C) three (D) none of these

Watch Video Solution

83. The value of the determinant $\begin{vmatrix} (a^x + a^{-x})^2 & (a^x - a^{-x})^2 & 1 \\ (b^x + b^{-x})^2 & (b^x - b^{-x})^2 & 1 \\ (c^x + c^{-x})^2 & (c^x - c^{-x})^2 & 1 \end{vmatrix}$

(A) is 0

(B) is independent of a

(C) depends on b only

(D) depends on a,b,and c

Watch Video Solution

Watch Video Solution

84. The vlaue of the determinant $\begin{vmatrix} b+c & a & a \\ b & c+a & b \\ c & c & a+b \end{vmatrix}$ (A) depends on a (B) depends on b (C) depends on c (D) dependent of a,b,c

Watch Video Solution

85. If $\text{Delta}_1 = |x\mathbf{a}xbaax| and \text{Delta}_2 = |xbax|$ are the given determinants, then $\text{Delta}_1 = 3(\text{Delta}_2)^2$ b. $\frac{d}{dx}(\text{Delta}_1) = 3\text{Delta}_2$ c. $\frac{d}{dx}(\text{Delta}_1) = 3(\text{Delta}_2)^2$ d. $\text{Delta}_1 = 3\text{Delta}23/2$

Watch Video Solution

86. Let a, b and c denote the sides BC, CA and AB respectively of ABC . If $|1ab1ca1bc| = 0,$ then find the value of $\sin^2 A + \sin^2 B + \sin^2 C$.

Watch Video Solution

87. Without expanding show that

$\left|b^2c^2bcb + \hat{}\ 2a^2cac + aa^2b^2aba + b\right| = 0$

Watch Video Solution

88. Let $f(x) = \begin{vmatrix} 1 & x & x+1 \\ 2x & x(x-1) & (x+1)x \\ 3x(x-1) & x(x-1)(x-2) & (x+1)x(x-1) \end{vmatrix}$ then

f(100) is equal to

Watch Video Solution

89. If

$px^4 + qx^3 + rx^2 + sx + t = \left|x^2 + 3 \times \ -1x + 3x + 12 - \ \times \ -3x - 3x\right.$

then t is equal to $39\ 20\ 15\ 21$

Watch Video Solution

90. if $f(x) = \begin{vmatrix} x-3 & 2x^2-18 & 3x^3-81 \\ x-5 & 2x^2-50 & 4x^3-500 \\ 1 & 2 & 3 \end{vmatrix}$ then $f(1)f(3) + f(3)f(5) + f(5)f(1)$ is equal to

Watch Video Solution

91. Given $A = \begin{vmatrix} a & b & 2c \\ d & e & 2f \\ l & m & 2n \end{vmatrix}, B = \begin{vmatrix} f & 2d & e \\ 2n & 4l & 2m \\ c & 2a & b \end{vmatrix}$, then the value of B/A is __________.

Watch Video Solution

92. Let $\triangle = \begin{vmatrix} \lfloor n & \lfloor n+1 & \lfloor n+2 \\ \lfloor n+1 & \lfloor n+2 & \lfloor n+3 \\ \lfloor n+2 & \lfloor n+3 & \lfloor n+4 \end{vmatrix}$ then

(A) $\triangle = \lfloor n \lfloor n+1 \lfloor n+2$ (B) $\triangle = 2\lfloor n \lfloor n+1 \lfloor n+2$ (C) $\dfrac{\triangle}{(\lfloor n)^3} - 4$ is divisible by n (D) $\dfrac{\triangle}{(\lfloor n)^3} - 4$ is divisible by n^2

Watch Video Solution

93. The determinant $\begin{vmatrix} C(x,1) & C(x,2) & C(x,3) \\ C(y,1) & C(y,2) & C(y,3) \\ C(z,1) & C(z,2) & C(z,3) \end{vmatrix} =$ (i) $\frac{1}{3}xyz(x+y)(y+z)(z+x)$ (ii) $\frac{1}{4}xyz(x+y-z)(y+z-x)$ (iii) $\frac{1}{12}xyz(x-y)(y-z)(z-x)$ (iv) none

Watch Video Solution

94. The value of the determinant $\begin{vmatrix} 1+a & 1 & 1 \\ 1 & 1+a & 1 \\ 1 & 1 & 1+a \end{vmatrix}$ is zero if (A) $a = -3$ (B) $a = 0$ (C) $a = 2$ (D) $a = 1$

Watch Video Solution

95. The determinant $|aba\alpha + \mathbf{c}b\alpha + ca\alpha + \boldsymbol{\alpha} + c0| = 0,$ 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 $ax^2 + bc + c = 0$ $(x - \alpha)$ is a factor of $ax^2 + 2bx + c$

Watch Video Solution

96. Value of $'\alpha'$ for which system of equations $x+y+z=1, x+2y+4z=\alpha$ and $x+4y+10z=\alpha^2$ is consistent, are

Watch Video Solution

97. If $\alpha, \beta \text{ and } \gamma$ are such that $\alpha+\beta+\gamma=0$, then $\begin{vmatrix} 1 & \cos\gamma & \cos\beta \\ \cos\gamma & 1 & \cos\alpha \\ \cos\beta & \cos\alpha & 1 \end{vmatrix}$

Watch Video Solution

98. If $p(x), q(x), r(x)$ be polynomials of degree one and α, β, γ are real nubers then $\begin{vmatrix} p(\alpha) & p(\beta) & p(\gamma) \\ q(\alpha) & q(\beta) & q(\gamma) \\ r(\alpha) & r(\beta) & r(\gamma) \end{vmatrix}$ (A) independent of α (B) independent of β (C) independent γ (D) independent of all $\alpha, \beta \text{ and } \gamma$

Watch Video Solution

99. If $f(x)$ and $g(x)$ are functions such that $f(x+y) = f(x)g(y) + g(x)f(y)$, then in $\begin{vmatrix} f(\alpha) & g(\alpha) & f(\alpha+\theta) \\ f(\beta) & g(\beta) & f(\beta+\theta) \\ f(\lambda) & g(\lambda) & f(\lambda+\theta) \end{vmatrix}$ is independent of

Watch Video Solution

100. Let a,b,c be even natural numbers, then $\triangle = \begin{vmatrix} a-x & a & a+x \\ b-x & b & b+x \\ c-x & c & c+x \end{vmatrix}$ is a multiple of (A) 2 (B) 5 (C) 3 (D) none of these

Watch Video Solution

101. Consider the following system of equations $a_1x + b_1y + c_1z = d_1, a_2x + b_2y + c_2z = d_2, a_3x + b_3y + c_3z = d_3$ Let $\triangle = \begin{vmatrix} a_1 & b_1 & c_1 \\ a_2 & b_2 & c_2 \\ a_3 & b_3 & c_3 \end{vmatrix}, \triangle_1 = \begin{vmatrix} d_1 & b_1 & c_1 \\ d_2 & b_2 & c_2 \\ d_3 & b_3 & c_3 \end{vmatrix},, \triangle_2 = \begin{vmatrix} a_1 & d_1 & c_1 \\ a_2 & d_2 & c_2 \\ a_3 & d_3 & c_3 \end{vmatrix},, \triangle_3 =$, The given system of equations will have i. unique solution if $\triangle \neq 0$ ii. infinitely many solutions if $\triangle = \triangle_1 = \triangle_3 = 0$. iii. no solution if

$\triangle = 0$and any of $\triangle_1$, $\triangle_2$, $\triangle_3$ is none zero. On the basis of above informatioin answer thefollowing questions for the following system of linear equations.

. $2x + ay + 6z = 8, x + 2y + bz = 5, x + y + 3z = 4$

The given system of equatioin has unique solution if

(A) $a = 2, b = 2$

(B) $a \neq 2, b = 3$

(C) $a \neq 2, b \neq 3$

(D) $a = 2, b \neq 3$

Watch Video Solution

102. Consider the following system of equations $a_1x + b_1y + c_1z = d_1, a_2x + b_2y + c_2z = d_2, a_3x + b_3y + c_3z = d_3$ Let

$$\triangle = \begin{vmatrix} a_1 & b_1 & c_1 \\ a_2 & b_2 & c_2 \\ a_3 & b_3 & c_3 \end{vmatrix}, \triangle_1 = \begin{vmatrix} d_1 & b_1 & c_1 \\ d_2 & b_2 & c_2 \\ d_3 & b_3 & c_3 \end{vmatrix}, , \triangle_2 = \begin{vmatrix} a_1 & d_1 & c_1 \\ a_2 & d_2 & c_2 \\ a_3 & d_3 & c_3 \end{vmatrix}, , \triangle_3 =$$

, The given system of equations will have i. unique solution if $\triangle \neq 0$ ii. infinitely many solutions if $\triangle = \triangle_1 = \triangle_3 = 0$. iii. no solution if $\triangle = 0$and any of $\triangle_1$, $\triangle_2$, $\triangle_3$ is none zero. On the basis of above informatioin answer thefollowing questions for the following system of linear equations.

. $2x + ay + 6z = 8, x + 2y + bz = 5, x + y + 3z = 4$

The given system of equatioin has unique solution if

(A) $a = 2, b = 2$

(B) $a \neq 2, b = 3$

(C) $a \neq 2, b \neq 3$

(D) $a = 2, b \neq 3$

Watch Video Solution

103. Consider the following system of equations $a_1x + b_1y + c_1z = d_1, a_2x + b_2y + c_2z = d_2, a_3x + b_3y + c_3z = d_3$ Let $\triangle = \begin{vmatrix} a_1 & b_1 & c_1 \\ a_2 & b_2 & c_2 \\ a_3 & b_3 & c_3 \end{vmatrix}, \triangle_1 = \begin{vmatrix} d_1 & b_1 & c_1 \\ d_2 & b_2 & c_2 \\ d_3 & b_3 & c_3 \end{vmatrix}, , \triangle_2 = \begin{vmatrix} a_1 & d_1 & c_1 \\ a_2 & d_2 & c_2 \\ a_3 & d_3 & c_3 \end{vmatrix}, , \triangle_3 =$, The given system of equations will have i. unique solution if $\triangle \neq 0$ ii. infinitely many solutions if $\triangle = \triangle_1 = \triangle_3 = 0$. iii. no solution if $\triangle = 0$and any of $\triangle_1, \triangle_2, \triangle_3$ is none zero. On the basis of above informatioin answer thefollowing questions for the following system of linear equations.

. $2x + ay + 6z = 8, x + 2y + bz = 5, x + y + 3z = 4$

The given system of equatioin has unique solution if

(A) $a = 2, b = 2$

(B) $a \neq 2, b = 3$

(C) $a \neq 2, b \neq 3$

(D) $a = 2, b \neq 3$

Watch Video Solution

104. Consider the following system of equations $a_1x + b_1y + c_1z = d_1, a_2x + b_2y + c_2z = d_2, a_3x + b_3y + c_3z = d_3$ Let

$$\triangle = \begin{vmatrix} a_1 & b_1 & c_1 \\ a_2 & b_2 & c_2 \\ a_3 & b_3 & c_3 \end{vmatrix}, \triangle_1 = \begin{vmatrix} d_1 & b_1 & c_1 \\ d_2 & b_2 & c_2 \\ d_3 & b_3 & c_3 \end{vmatrix}, , \triangle_2 = \begin{vmatrix} a_1 & d_1 & c_1 \\ a_2 & d_2 & c_2 \\ a_3 & d_3 & c_3 \end{vmatrix}, , \triangle_3 =$$

, The given system of equations will have i. unique solution if $\triangle \neq 0$ ii. infinitely many solutions if $\triangle = \triangle_1 = \triangle_3 = 0$. iii. no solution if $\triangle = 0$and any of $\triangle_1 , \triangle_2 , \triangle_3$ is none zero. On the basis of above informatioin answer thefollowing questions for the following system of linear equations.

. $2x + ay + 6z = 8, x + 2y + bz = 5, x + y + 3z = 4$

The given system of equatioin has unique solution if

(A) $a = 2, b = 2$

(B) $a \neq 2, b = 3$

(C) $a \neq 2, b \neq 3$

(D) $a = 2, b \neq 3$

Watch Video Solution

105. Consider the following system of equations $a_1x + b_1y + c_1z = d_1, a_2x + b_2y + c_2z = d_2, a_3x + b_3y + c_3z = d_3$ Let $\triangle = \begin{vmatrix} a_1 & b_1 & c_1 \\ a_2 & b_2 & c_2 \\ a_3 & b_3 & c_3 \end{vmatrix}, \triangle_1 = \begin{vmatrix} d_1 & b_1 & c_1 \\ d_2 & b_2 & c_2 \\ d_3 & b_3 & c_3 \end{vmatrix}, , \triangle_2 = \begin{vmatrix} a_1 & d_1 & c_1 \\ a_2 & d_2 & c_2 \\ a_3 & d_3 & c_3 \end{vmatrix}, , \triangle_3 =$, The given system of equations will have i. unique solution if $\triangle \neq 0$ ii. infinitely many solutions if $\triangle = \triangle_1 = \triangle_3 = 0$. iii. no solution if $\triangle = 0$and any of $\triangle_1 , \triangle_2 , \triangle_3$ is none zero. On the basis of above informatioin answer thefollowing questions for the following system of linear equations.

.$x + y + z = 6, x + 2y + 3z = 14, 2x + 5y + \lambda = \mu$

The given system of equations has infinite solution if

(A) $\lambda = 8, \mu = 36$

(B) $\lambda \neq 8, \mu \varepsilon R$

(C)$\lambda = 8, \mu \neq 36$

(D)$\lambda \neq 8, \mu \neq 36$

Watch Video Solution

106. Consider the following system of equations $a_1x + b_1y + c_1z = d_1, a_2x + b_2y + c_2z = d_2, a_3x + b_3y + c_3z = d_3$ Let $\triangle = \begin{vmatrix} a_1 & b_1 & c_1 \\ a_2 & b_2 & c_2 \\ a_3 & b_3 & c_3 \end{vmatrix}, \triangle_1 = \begin{vmatrix} d_1 & b_1 & c_1 \\ d_2 & b_2 & c_2 \\ d_3 & b_3 & c_3 \end{vmatrix}, , \triangle_2 = \begin{vmatrix} a_1 & d_1 & c_1 \\ a_2 & d_2 & c_2 \\ a_3 & d_3 & c_3 \end{vmatrix}, , \triangle_3 =$, The given system of equations will have i. unique solution if $\triangle \neq 0$ ii. infinitely many solutions if $\triangle = \triangle_1 = \triangle_3 = 0$. iii. no solution if $\triangle = 0$and any of $\triangle_1$, $\triangle_2$, $\triangle_3$ is none zero. On the basis of above informatioin answer thefollowing questions for the following system of linear equations.

$x + y + z = 6, x + 2y + 3z = 14, 2x + 5y + \lambda = \mu$

The given system of equations has no solution if

(A) $\lambda = 8, \mu = 10$

(B) $\lambda \neq 8, \mu \varepsilon R$

(C) $\lambda = 8, \mu \neq 10$

(D) $\lambda \neq 8, \mu \neq 10$

Watch Video Solution

107. Consider the following system of equations $a_1x + b_1y + c_1z = d_1, a_2x + b_2y + c_2z = d_2, a_3x + b_3y + c_3z = d_3$ Let $\triangle = \begin{vmatrix} a_1 & b_1 & c_1 \\ a_2 & b_2 & c_2 \\ a_3 & b_3 & c_3 \end{vmatrix}, \triangle_1 = \begin{vmatrix} d_1 & b_1 & c_1 \\ d_2 & b_2 & c_2 \\ d_3 & b_3 & c_3 \end{vmatrix}, , \triangle_2 = \begin{vmatrix} a_1 & d_1 & c_1 \\ a_2 & d_2 & c_2 \\ a_3 & d_3 & c_3 \end{vmatrix}, , \triangle_3 =$, The given system of equations will have i. unique solution if $\triangle \neq 0$ ii. infinitely many solutions if $\triangle = \triangle_1 = \triangle_3 = 0$. iii. no solution if $\triangle = 0$and any of $\triangle_1$, $\triangle_2$, $\triangle_3$ is none zero. On the basis of above informatioin answer thefollowing questions for the following system of linear equations.

$.x + y + z = 6, x + 2y + 3z = 14, 2x + 5y + \lambda = \mu$

The given system of equations has infinite solution if

(A) $\lambda = 8, \mu = 36$

(B) $\lambda \neq 8, \mu \varepsilon R$

(C)$\lambda = 8, \mu \neq 36$

(D)$\lambda \neq 8, \mu \neq 36$

Watch Video Solution

108. Consider the following system of equations $a_1x + b_1y + c_1z = d_1, a_2x + b_2y + c_2z = d_2, a_3x + b_3y + c_3z = d_3$ Let $\triangle = \begin{vmatrix} a_1 & b_1 & c_1 \\ a_2 & b_2 & c_2 \\ a_3 & b_3 & c_3 \end{vmatrix}, \triangle_1 = \begin{vmatrix} d_1 & b_1 & c_1 \\ d_2 & b_2 & c_2 \\ d_3 & b_3 & c_3 \end{vmatrix},, \triangle_2 = \begin{vmatrix} a_1 & d_1 & c_1 \\ a_2 & d_2 & c_2 \\ a_3 & d_3 & c_3 \end{vmatrix},, \triangle_3 =$, The given system of equations will have i. unique solution if $\triangle \neq 0$ ii. infinitely many solutions if $\triangle = \triangle_1 = \triangle_3 = 0$. iii. no solution if $\triangle = 0$and any of $\triangle_1$, $\triangle_2$, $\triangle_3$ is none zero. On the basis of above informatioin answer thefollowing questions for the following system of linear equations.

. $2x + ay + 6z = 8, x + 2y + bz = 5, x + y + 3z = 4$

The given system of equatioin has unique solution if

(A) $a = 2, b = 2$

(B) $a \neq 2, b = 3$

(C) $a \neq 2, b \neq 3$

(D) $a = 2, b \neq 3$

Watch Video Solution

109. Consider the following system of equations $a_1x + b_1y + c_1z = d_1, a_2x + b_2y + c_2z = d_2, a_3x + b_3y + c_3z = d_3$ Let $\triangle = \begin{vmatrix} a_1 & b_1 & c_1 \\ a_2 & b_2 & c_2 \\ a_3 & b_3 & c_3 \end{vmatrix}, \triangle_1 = \begin{vmatrix} d_1 & b_1 & c_1 \\ d_2 & b_2 & c_2 \\ d_3 & b_3 & c_3 \end{vmatrix}, , \triangle_2 = \begin{vmatrix} a_1 & d_1 & c_1 \\ a_2 & d_2 & c_2 \\ a_3 & d_3 & c_3 \end{vmatrix}, , \triangle_3 =$, The given system of equations will have i. unique solution if $\triangle \neq 0$ ii. infinitely many solutions if $\triangle = \triangle_1 = \triangle_3 = 0$. iii. no solution if $\triangle = 0$and any of $\triangle_1$, $\triangle_2$, $\triangle_3$ is none zero. On the basis of above informatioin answer thefollowing questions for the following system of linear equations.

$x + y + z = 6, x + 2y + 3z = 14, 2x + 5y + \lambda = \mu$

The given system of equations has no solution if

(A) $\lambda = 8, \mu = 10$

(B) $\lambda \neq 8, \mu \varepsilon R$

(C) $\lambda = 8, \mu \neq 10$

(D) $\lambda \neq 8, \mu \neq 10$

Watch Video Solution

110. If α, β, γ are real numbers, then without expanding at any stage, show that

$|1 \cos(\beta - \alpha)\cos(\gamma - \alpha)\cos(\alpha - \beta)1\cos(\gamma - \beta)\cos(\alpha - \gamma)\cos(\beta - \gamma)1| =$

Watch Video Solution

111. about to only mathematics

Watch Video Solution

112. If $|pbcaqcabr| = 0$, find the value of $\frac{p}{p-a} + \frac{q}{q-b} + \frac{r}{r-c}, \; p \neq a, \;\; q = b, \;\; r \neq c$

Watch Video Solution

113. Prove that:

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

Watch Video Solution

114. If $f(n) = \begin{vmatrix} n! & (n+1)! & (n+2)! \\ (n+1)! & (n+2)! & (n+3)! \\ (n+2)! & (n+3)! & (n+4)! \end{vmatrix}$ Then the value of 1/1020[(f(100))/(f(99))]` is

Watch Video Solution

115. If $f(x) = \begin{vmatrix} x & 1 & 1 \\ 0 & 1+x & 1 \\ -x^2 & 1+x & 1+x \end{vmatrix}$, then $\frac{1}{10^4} f(100)$ is equal to

Watch Video Solution

116. Let $D = \begin{vmatrix} a_1 & b_1 & c_1 \\ a_2 & b_2 & c_2 \\ a_3 & b_3 & c_3 \end{vmatrix}, D_1 = \begin{vmatrix} a_1 + pb_1 & b_1 + qc_1 & c1 + ra_1 \\ a_2 + pb_2 & b_2 + qc_2 & c_2 + ra_2 \\ a_3 + pb_3 & b_3 + qc_3 & c_3 + ra_3 \end{vmatrix}$, then the value of $\dfrac{2010D - D_1}{D_1}$ is

Watch Video Solution

117. Assertion: $\triangle \; = 0$, Reason value of a determinnt is 0 when any two ros or columns are identical. (A) Both A and R are true and R is the correct explanation of A (B) Both A and R are true R is not te correct explanation of A (C) A is true but R is false. (D) A is false but R is true.

Watch Video Solution

118. The determinant $|xp + yxyyp + zyz0xp + yyp + z| = 0$ if x, y, z

Watch Video Solution

119. The parameter on which the value of the determinant $|1 \quad a \quad a^2],[\cos(p-d)x \quad \cos px, \cos(p+d)x],[\sin(p-d)x \quad \sin px \quad \sin(p+$ does not depend is a b. p c. d d. x

Watch Video Solution

120. find the value of the determinant $\begin{vmatrix} bc & ca & ab \\ p & q & r \\ 1 & 1 & 1 \end{vmatrix}$ Where a,b and c are respectively the pth qth and rth terms of a harmonic progression.

Watch Video Solution

121. Suppose $f(x)$ is a function satisfying the following conditions: $f(0) = 2, f(1) = 1$ f has a minimum value at $x = \frac{5}{2}$ For all $x, f'(x) = |2ax2ax - 12ax + b + 1 + 1 - 12(ax + b)2ax + 2b + 12ax +$ where a, b are some constants. Determine the constants a, b , and the function $f(x)$

Watch Video Solution

122. Suppose $f(x)$ is a function satisfying the following conditions: $f(0) = 2, f(1) = 1$ f has a minimum value at $x = \frac{5}{2}$ For all $x, f'(x) = |2ax2ax - 12ax + b + 1 + 1 - 12(ax + b)2ax + 2b + 12ax +$ where a, b are some constants. Determine the constants a, b , and the function $f(x)$

Watch Video Solution

123. Suppose $f(x)$ is a function satisfying the following conditions: $f(0) = 2, f(1) = 1$ f has a minimum value at $x = \frac{5}{2}$ For all $x, f'(x) = |2ax2ax - 12ax + b + 1 + 1 - 12(ax + b)2ax + 2b + 12ax +$ where a, b are some constants. Determine the constants a, b , and the function $f(x)$

Watch Video Solution

124. 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 f(100) is equal to -

A. 0

B. 1

C. 100

D. -100

Watch Video Solution

125. 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 a. $-1, 2$ b. $1, 2$ c. $0, 1$ d. $-1, 1$

Watch Video Solution

126. 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

127. The number of distinct real roots of $|\sin x \cos x \cos x \cos x \sin x \cos x \cos x \cos x \sin x| = 0$ in the interval $-\frac{\pi}{4} \leq x \leq \frac{\pi}{4}$ is 0 (b) 2 (c) 1 (d) 3

Watch Video Solution

128. Let a,b,c be real numbers with $a^2 + b^2 + c^2 = 1$. Then 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

Watch Video Solution

129. If the system of equations $x + ay = 0, az + y = 0$ and $ax + z = 0$ has infinite solutions, then the value of a is

(a) -1 (b) 1 (c) 0 (d) no real values

Watch Video Solution

130. Given $2x - y + 2z = 2, x - 2y + z = -4, x + y + \lambda z = 4,$ then value of λ such that given system of equations has no solution, is

Watch Video Solution