doubtnut
India's Number 1 Education App

MATHS

BOOKS - BITSAT GUIDE

DETERMINANTS

Practice Exercise

1. If A $A = \begin{matrix} 23 & 1+i & -i \\ -i & -3i & 4-5i \\ i & 4+5i & 17 \end{matrix}$ then det (A) is

A. complex number with positive real part

B. complex number with negative imaginary part

C. pure imaginary

D. real

Answer: D

View Text Solution

2. Let $A = \begin{matrix} \cos a & -\sin a & 0 \\ \sin a & \cos a & 0 \\ 0 & 0 & 1 \end{matrix}$ then

A. $A_{a+\beta} = A_a A_\beta$

B. $A_a^{-1} = A_a$

C. $A_a^{-1} = -A_a$

D. $A_a^2 = -l$

Answer: A

View Text Solution

3. The value of third order determinant is 11, then the value of the square of the determinant formed by the cofactors will be

A. 11

B. 121

C. 1331

D. 14641

Answer: D

Watch Video Solution

4. 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. 0

B. 1

C. 2

D. 3

Answer: C

Watch Video Solution

5. The determinant $\begin{vmatrix} xp+y & x & y \\ yp+z & y & z \\ 0 & xp+y & yp+z \end{vmatrix} = 0$, if

A. x, y and zare in AP

B. x, y and z are in GP

C. x, y and z are in HP

D. xy, yz and zx are in AP

Answer: B

Watch Video Solution

6. If $\begin{vmatrix} a-b-c & 2a & 2a \\ 2b & b-c-a & 2b \\ 2c & 2c & c-a-b \end{vmatrix} = k(a+b+c)^3$, then k is equal to

A. 0

B. 1

C. 2

D. 3

Answer: B

Watch Video Solution

7. If α, β, γ are cube roots of unity, then the value of $\begin{vmatrix} e^{\alpha} & e^{2\alpha} & (e^{3\alpha}-1) \\ e^{\beta} & e^{2\beta} & (e^{3\beta}-1) \\ e^{\gamma} & e^{2\gamma} & (e^{3\gamma}-1) \end{vmatrix} =$

A. 0

B. e

C. e^2

D. e^3

Answer: A

Watch Video Solution

8. If $\begin{vmatrix} a & a^2 & 1+a^3 \\ b & b^2 & 1+b^3 \\ c & c^2 & 1+c^3 \end{vmatrix} = 0$ and vectors $(1, a, a^2)$, $(1, b, b^2)$ and $(1, c, c^2)$ are non-coplanar, then the value of abc +1 is

A. 2

B. -1

C. 1

D. 0

Answer: B

Watch Video Solution

9. Let $px^4 + qx^3 + rx^2 + sx + t = \begin{vmatrix} x^2+3x & x-1 & x+3 \\ x+1 & -2 & x-4 \\ x-3 & x+4 & 3x \end{vmatrix}$ be an identity where p,q,r,s and t are constants, then the value of s is equal to

A. 0

B. 1

C. 2

D. -1

Answer: A

Watch Video Solution

10. If $a_1, a_2, a_3...$ are in G.P. then the value of

$$\begin{vmatrix} \log a_n, \log a_{n+1}, \log a_{n+2} \\ \log a_{n+3}, \log a_{n+4}, \log a_{n+5} \\ \log a_{n+6}, \log a_{n+7}, \log a_{n+8} \end{vmatrix}$$ is

A. 0

B. 1

C. 2

D. 4

Answer: A

Watch Video Solution

11. If $f(y) = \begin{vmatrix} a & -1 & 0 \\ ay & a & -1 \\ ay^2 & ay & a \end{vmatrix}$, then $f(2y) - f(y)$ is divisible by

A. y^3

B. 0

C. $2a + 3y$

D. y^2

Answer: C

View Text Solution

12. Suppose $\begin{vmatrix} x+1 & 3 & 5 \\ 2 & x+2 & 5 \\ 2 & 3 & x+4 \end{vmatrix} = 0$, then the value of x is equal to

A. $1, 9$

B. $-1, 9$

C. $-1, \ -9$

D. $1, \ -9$

Answer: D

Watch Video Solution

13. If $a+b+c=0$, then one root of $\begin{vmatrix} a-n & c & b \\ c & b-n & a \\ b & a & c-n \end{vmatrix} = 0$ is

A. $n=1$

B. $n=2$

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

D. $n=0$

Answer: D

Watch Video Solution

14. Let $A = \begin{bmatrix} 5 & 5\alpha & \alpha \\ 0 & \alpha & 5\alpha \\ 0 & 0 & 5 \end{bmatrix}$ If $\left|A^2\right| = 25$, then $|\alpha|$ equals :

A. 5^2

B. 1

C. $\frac{1}{5}$

D. 5

Answer: C

Watch Video Solution

15. If D = $\begin{vmatrix} 1 & 1 & 1 \\ 1 & 1+x & 1 \\ 1 & 1 & 1+y \end{vmatrix}$ $\text{for} \quad x \neq 0, y \neq 0$ then D is

A. divisible by neitherx nory

B. divisible by bothx andy

C. divisible byx but noty

D. divisible byy but notx

Answer: B

Watch Video Solution

16. If A,B and C are the angles of a triangle and

$$\begin{vmatrix} 1 & 1 & 1 \\ 1+\sin A & 1+\sin B & 1+\sin C \\ \sin A+\sin^2 A & \sin B+\sin^2 B & \sin C \sin^2 C \end{vmatrix}=0$$

then prove that Δ ABC must be isoceles.

A. right angled triangle

B. equilateral triangle

C. isosceles triangle

D. scalene triangle

Answer: C

Watch Video Solution

17. Prove that $\Delta = \begin{vmatrix} a+bx & c+dx & p+qx \\ ax+b & cx+d & px+q \\ u & v & w \end{vmatrix} = (1-x^2)\begin{vmatrix} a & c & p \\ b & d & q \\ u & c & w \end{vmatrix}$

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

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

C. $(1-x^2)\begin{vmatrix} a & c & p \\ b & d & q \\ u & v & w \end{vmatrix}$

D. $(x^2-1)\begin{vmatrix} a & c & p \\ b & d & q \\ u & v & w \end{vmatrix}$

Answer: C

Watch Video Solution

18. If $1, \omega, \omega^2$ are the cube roots of unity , then $\Delta = \begin{vmatrix} 1 & \omega^n & \omega^{2n} \\ \omega^n & \omega^{2n} & 1 \\ \omega^{2n} & 1 & \omega^n \end{vmatrix}$ is equal to :

A. 0

B. 1

C. ω

D. ω^2

Answer: A

Watch Video Solution

19. 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 .

A. > 0

B. ≥ 0

C. < 0

D. ≤ 0

Answer: C

Watch Video Solution

20. $\begin{vmatrix} n & n+1 & n+2 \\ {}^{n}P_{n} & {}^{(n+1)}P_{(n+1)} & {}^{(n+2)}P_{(n+2)} \\ {}^{n}C_{n} & {}^{(n+1)}C_{(n+1)} & {}^{(n+2)}C_{(n+2)} \end{vmatrix}$ is equal to

A. $n(n!)$

B. $(n+1)(n+1)!$

C. $(n+2)(n+2)!$

D. $\left(n^2+n+1\right)n!$

Answer: D

Watch Video Solution

21. When 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 , the constant term in than or equal to expression is

A. 0

B. 1

C. -1

D. 2

Answer: C

Watch Video Solution

22. 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

A. 0

B. 50

C. 1

D. -50

Answer: A

Watch Video Solution

23. If ω is an imaginary cube root of unity, then the value of $\begin{vmatrix} a & b\omega^2 & a\omega \\ b\omega & c & b\omega^2 \\ c\omega^2 & a\omega & c \end{vmatrix}$ is

A. $a^3 + b^3 + c^2 - 3abc$

B. $a^2b - b^2c$

C. 0

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

Answer: C

Watch Video Solution

24. If the number of distinct real roots of

$$\begin{vmatrix} \sin x & \cos x & \cos x \\ \cos x & \sin x & \cos x \\ \cos x & \cos x & \sin x \end{vmatrix} = 0 \text{ in the interval } -\frac{\pi}{4} \leq x \leq \frac{\pi}{4} \text{ is}$$

A. 0

B. 1

C. 2

D. 3

Answer: B

Watch Video Solution

25. for $x, x, z > 0$ Prove that $\begin{vmatrix} 1 & \log_x y & \log_x z \\ \log_y x & 1 & \log_y z \\ \log_z x & \log_z y & 1 \end{vmatrix} = 0$

A. 0

B. 1

C. -1

D. none

Answer: A

Watch Video Solution

26. If $\begin{vmatrix} 1+\sin^2\theta & \cos^2\theta & 4\sin 4\theta \\ \sin^2\theta & 1+\cos^2\theta & 4\sin 4\theta \\ \sin^2\theta & \cos^2\theta & 1+4\sin 4\theta \end{vmatrix} = 0$, then θ is equal to

A. $\frac{7\pi}{24}, \frac{11\pi}{24}$

B. $\frac{5\pi}{24}, \frac{7\pi}{24}$

C. $\frac{11\pi}{24}, \frac{\pi}{24}$

D. $\frac{\pi}{24}, \frac{7\pi}{24}$

Answer: A

View Text Solution

27. If $\alpha, \beta \& \gamma$ are the roots the equations $x^3 + px + q = 0$ then the value of the determinant $\begin{bmatrix} \alpha & \beta & \gamma \\ \beta & \gamma & \alpha \\ \gamma & \alpha & \beta \end{bmatrix}$

A. 0

B. -2

C. 2

D. 4

Answer: A

Watch Video Solution

28. If $a^2 + b^2 + c^2$=-2 and

$\begin{vmatrix} 1 + a^2 x & (1 + b^2)x & (1 + c^2)x \\ (1 + a^2)x & 1 + b^2 x & (1 + c^2)x \\ (1 + a^2)x & (1 + b^2)x & (1 + c^2)x \end{vmatrix}$ then f(x) is a polynomial of degree

A. 0

B. 1

C. 2

D. 3

Answer: C

Watch Video Solution

29. If α, β, γ are the roots of $x^3 + ax^2 + b = 0$, then the value of $\begin{vmatrix} \alpha & \beta & \gamma \\ \beta & \gamma & \alpha \\ \gamma & \alpha & \beta \end{vmatrix}$, is

A. $-a^3$

B. $a^3 - ab$

C. a^3

D. $a^2 - 3b$

Answer: C

Watch Video Solution

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

A. a

B. p

C. d

D. x

Answer: B

Watch Video Solution

31. If $e^{i\theta} = \cos\theta + i\sin\theta$, $A+B+C=\pi$ 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. $Re(z) = 4$

B. $Im(z) = 0$

C. $Re(z) = -4$

D. $Im(z) = -1$

Answer: C

View Text Solution

32. If $\alpha, \beta \text{and} \gamma$ are real number 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.

A. $\begin{vmatrix} \cos\alpha & \sin\alpha & 1 \\ \cos\beta & \sin\beta & 1 \\ \cos\gamma & \sin\gamma & 1 \end{vmatrix}^2$

B. $\begin{vmatrix} \sin\alpha & \cos\alpha & 0 \\ \sin\beta & \cos\beta & 0 \\ \sin\gamma & \cos\gamma & 0 \end{vmatrix}^2$

C. $\begin{vmatrix} \cos\alpha & \sin\alpha & 0 \\ \sin\beta & 0 & \cos\beta \\ 0 & \cos\gamma & \sin\gamma \end{vmatrix}^2$

D. none of these

Answer: B

Watch Video Solution

33. If A, B and C are angles of a triangle then the determinant $\begin{vmatrix} -1 & \cos C & \cos B \\ \cos C & -1 & \cos A \\ \cos B & \cos A & -1 \end{vmatrix}$ is equal to

A. 0

B. -1

C. 1

D. none of these

Answer: A

Watch Video Solution

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

$= \left(a^3 + b^3 + c^3 + kabc\right)^2$, then the value of k is

A. 3

B. -3

C. 4

D. 0

Answer: B

View Text Solution

35. If

$\alpha, \beta \neq 0$ and $f(n) = \alpha^n + \beta^n$ and $\begin{vmatrix} 3 & 1 + f(1) & 1 + f(2) \\ 1 + f(1) & 1 + f(2) & 1 + f(3) \\ 1 + f(2) & 1 + f(3) & 1 + f(4) \end{vmatrix} = k(1$

, then k is equal to

A. $\alpha\beta$

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

C. 1

D. -1

Answer: C

Watch Video Solution

36. Using the factor theorem it is found that $a+b, b+candc+a$ are three factors of the determinant $|-2aa+ba+cb+a-2++ac+b-2c|$. The other factor in the value of the determinant is (a) 4 (b) 2 (c_ $a+b+c$ (d) none of these

A. 4

B. 2

C. $a+b+c$

D. none of these

Answer: A

Watch Video Solution

37. If the coordinates of the vertices of an equilateral triangle with sides of length a are $(x_1, y_1), (x_2, y_2)$ and (x_3, y_3) then

$$\begin{vmatrix} x_1 & y_1 & 1 \\ x_2 & y_2 & 1 \\ x_3 & y_3 & 1 \end{vmatrix} = \frac{3a^4}{4}$$

A. $\frac{3a^4}{4}$

B. $\frac{3a^5}{4}$

C. $\frac{3a^2}{2}$

D. $\frac{3a^2}{4}$

Answer: A

Watch Video Solution

38. The equations $\lambda x - y = 2, 2x - 3y = -\lambda$ and $3x - 2y = -1$ are consistent for

A. $\lambda = -4$

B. $\lambda = -1, 4$

C. $\lambda = -1$

D. $\lambda = 1, -4$

Answer: B

Watch Video Solution

39. If the equations are $x + y - 3 = 0$

$(1 + \beta)x + (2 + \beta)y - 8 = 0$ and $x - (1 + \beta)y + (2 + \beta) = 0,$ then the value of β for the consistent solution, is

A. 2

B. $\frac{16}{3}$

C. $\frac{-5}{3}$

D. $\frac{5}{3}$

Answer: C

Watch Video Solution

40. If $a > b > c$ and the system of equtions ax +by +by +cz =0,n bx +cy+az=0,cx+ay+bz=0 has a non-trivial solution then both the roots of the equadratic equation

$at^2 + bt + c$ are

A. non-real

B. of opposite sign

C. positive

D. complex

Answer: B

Watch Video Solution

Watch Video Solution

41. The value of a for which the system of equations

$a^3x + (a+1)^3y + (a+2)^3z = 0$

$ax + (a+1)y + (a+2)z = 0$

$x + y + z = 0$

has a non-zero solution is

A. -1

B. 2

C. 3

D. -2

Answer: A

Watch Video Solution

42. The number of values of k which the linear equations

$4x+ky+2z=0$

$kx+4y+z=0$

$2x+2y+z=0$

Possess a non-zero solution is

A. 2

B. 1

C. 0

D. 3

Answer: A

Watch Video Solution

43. If the trivial solution is the only solution of the system of equations

$x - ky + z = 0$

$kx + 3y - kz = 0$

$3x + y - z = 0$

Then, the set of all values of k is

A. $(2, \ -3)$

B. $R - \{2, \ -3\}$

C. $R - \{2\}$

D. $R - \{-3\}$

Answer: B

Watch Video Solution

44. Consider the system of linear equations

$x_1 + 2x_2 + x_3 = 3$

$2x_1 + 3x_2 + x_3 = 3$

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

Then, the system has

A. infinite number of solutions

B. exactly 3 solutions

C. a unique solution

D. no solution

Answer: D

Watch Video Solution

Bitsat Archives

1. The system of equations $x - y + 3z = 4, x + z = 2 \ x + y - z = 0$ has

A. a unique solution

B. finitely many solutions

C. infinitely many solutions

D. none of these

Answer: C

Watch Video Solution

2. If $\begin{vmatrix} 1 & a & a^2 \\ 1 & b & b^2 \\ 1 & c & c^2 \end{vmatrix} = k(a-b)(b-c)(c-a)$, then k is equal to

A. -2

B. 1

C. 2

D. abc

Answer: B

Watch Video Solution

3. $\begin{vmatrix} a+b & a & b \\ a & a+c & c \\ b & c & b+c \end{vmatrix}$ is equal to

A. 4abc

B. abc

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

D. $4a^2bc$

Answer: A

Watch Video Solution

4. The system $x + 4y - 2z = 3, 3x + y + 5z = 7$ and $2x + 3y + z = 5$ has

A. infinite number of solutions

B. unique solution

C. trivial solution

D. no solution

Answer: D

Watch Video Solution

5. If the three points (k,2k) (2k,3k) (3,1) are collinear, then k is equal to

A. -2

B. 1

C. $\frac{1}{2}$

D. $-\frac{1}{2}$

Answer: A

Watch Video Solution

6. $\begin{vmatrix} a-b-c & 2a & 2a \\ 2b & b-c-a & 2b \\ 2c & 2c & c-a-b \end{vmatrix}$

A. $(a-b-c)\left(a^2+b^2+c^2\right)$

B. $(a+b+c)^3$

C. $(a+b+c)(ab+bc+ca)$

D. none of the above

Answer: B

Watch Video Solution

7. If ω is cube root of unity, then $\begin{vmatrix} 1 & \omega & \omega^2 \\ \omega & \omega^2 & 1 \\ \omega^2 & 1 & \omega \end{vmatrix}$ is equal to

A. 1

B. ω

C. ω^2

D. 0

Answer: D

Watch Video Solution

8. The equations

$x + 2y + 3z = 1$

$2x + y + 3z = 1$

$5x + 5y + 9z = 4$

A. there is only one solution

B. there exists infinitely many solutions

C. there is no solution

D. none of the above

Answer: A

Watch Video Solution

9. If $C = 2\cos\theta$, then the value of the determinant $\Delta = \begin{vmatrix} C & 1 & 0 \\ 1 & C & 1 \\ 6 & 1 & c \end{vmatrix}$, is

A. $\dfrac{2\sin^2 2\theta}{\sin\theta}$

B. $8\cos^3\theta - 4\cos\theta + 6$

C. $\dfrac{2\sin 2\theta}{\sin\theta}$

D. $8\cos^3\theta + 4\cos\theta + 6$

Answer: B

Watch Video Solution

10. The solutions of the equation $\begin{vmatrix} x & 2 & -1 \\ 2 & 5 & x \\ -1 & 2 & x \end{vmatrix} = 0$ are

A. $3, \ -1$

B. $-3, 1$

C. $3, 1$

D. $-3, \ -1$

Answer: A

Watch Video Solution

11. $\begin{vmatrix} 1+\sin^2\theta & \sin^2\theta & \sin^2\theta \\ \cos^2\theta & 1+\cos^2\theta & \cos^2\theta \\ 4\sin 4\theta & 4\sin 4\theta & 1+4\sin 4\theta \end{vmatrix} = 0$, then $\sin 4\theta$ equals to

A. $\frac{1}{2}$

B. 1

C. $-\frac{1}{2}$

D. -1

Answer: C

Watch Video Solution

12. Let the homogeneous system of linear equations $px + y + z = 0$, $x + qy + z = 0$ and $x + y + rz = 0$, where $p, q, r \neq 1$, have a non-zero solution, then the value of $\frac{1}{1-p} + \frac{1}{1-q} + \frac{1}{1-r}$ is

A. -1

B. 0

C. 2

D. 1

Answer: D

View Text Solution

13. Let the determinant of a 3×3 matrix A be 6, then B is a matrix defined by $B = 5A^2$. Then, determinant of B is

A. 180

B. 100

C. 80

D. none of these

Answer: A

Watch Video Solution