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1. Let $\begin{bmatrix} a+3 & b^2+2 \\ 0 & -6 \end{bmatrix} = \begin{bmatrix} 2a+1 & 3b \\ 0 & b^2-5b \end{bmatrix}$, then

(a) a = 2, b =2 (b) a = -2 , b =2 (c) a =2, b= -2 (d) a = -2, b = -2

2. Let A be a skew symmetric matrix of odd then $|A|$ equals

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

3. The value of the third order determinant is 12, then value of the square of the determinant formed by the Cofactors will be

(a) 12 (b) 144 (c) 1728 (d) none of these

4. If $\begin{bmatrix} \lambda^2+3\lambda & \lambda-1 & \lambda-3 \\ \lambda+1 & \lambda-2 & \lambda-3 \\ \lambda-3 & \lambda+4 & 3\lambda \end{bmatrix} = A\lambda^4 + B\lambda^3 + C\lambda^2 + D\lambda + E$, then value of E equals

(a) 23 (b) 33 (c) 21 (d) none of these

5. 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 $\sum_{k=1}^{n} D_K = 90$, then n equals

(a) 8 (b) 10 (c) 9 (d) 7

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

(a) -2 (b) 1 (c) 0 (d) -1

7. Let A = $\begin{pmatrix} -4 & -3 & -3 \\ 1 & 0 & 1 \\ 4 & 4 & 3 \end{pmatrix}$, B = $\begin{pmatrix} -1 & -2 & -2 \\ 2 & 1 & -2 \\ 2 & -2 & 1 \end{pmatrix}$ and C = adj A + adj B, then det C = ?

(a) 112 (b) 56 (c) 28 (d) -112

8. If $\begin{bmatrix} x^2-4x & x^2 \\ x^2 & x^3 \end{bmatrix} = \begin{bmatrix} -3 & 1 \\ -x+2 & 1 \end{bmatrix}$ then x is equal

(a) 1 (b) -1 (c) -2 (d) 3

9. If A = $\begin{bmatrix} 1 & -\tan x \\ -\tan x & 1 \end{bmatrix}$, then the value of $|A'A^{-1}|$

(a) cos 4x (b) $\sec^2 x$ (c) – cos 4x (d) 1

10. If A = $\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ a & b & -1 \end{bmatrix}$, then A^2 equals to

(a) A (b) –A (c) null matrix (d) I

11. If the matrix $\begin{bmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & \alpha \end{bmatrix}$ is singular, then α =

(a) 3 (b) 4 (c) 5 (d) 2

12. If A = $\begin{bmatrix} \cos x & \sin x \\ -\sin x & \cos x \end{bmatrix}$ and A adj (A) = k $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ then the value of k is

(a) sin x cos x (b) 1 (c) 0 (d) 3

13. If $f(x) = \begin{bmatrix} 1 & 3\cos x & 1 \\ \sin x & 1 & 3\cos x \\ 1 & \sin x & 1 \end{bmatrix}$

(a) 5 (b) 20 (c) 10 (d) 15

14. The matrix $\begin{bmatrix} 1 & 1 & 3 \\ 5 & 2 & 6 \\ -2 & -1 & -3 \end{bmatrix}$ is a

(a) involuntary matrix (b) orthogonal matrix (c) nilpotent matrix (d) none of these

15. If A and B are square matrix of order 3, then

(a) adj (AB) = - adj (B) + adj(B)
(b) $(A+B)^{-1} = A^{-1} + B^{-1}$
(c) AB = 0 $\Rightarrow |A| = 0$ or $\Rightarrow |B| = 0$
(d) AB = 0 $\Rightarrow |A| = 0$ and $|B| = 0$

16. Maximum value of $\begin{vmatrix} 1+\sin^2 x & \cos^2 x & 4\sin 2x \\ \sin^2 x & 1+\cos^2 x & \sin 2x \\ \sin^2 x & \cos^2 x & 1+4\sin 2x \end{vmatrix}$ is

(a) 4 (b) 6 (c) 2 (d) none of these

17. If A, B and C are the angles of a non –right angled triangle ABC, then the value of

$\begin{vmatrix} \tan A & 1 & 1 \\ 1 & \tan B & 1 \\ 1 & 1 & \tan C \end{vmatrix}$ is equal to

(a) 1 (b) 2 (c) -1 (d) -2

18. 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 $f(2) = 5, then \sum_{r=1}^{20} f(x)$ equals

(a) 5 (b) 10 (c) 100 (d) none of these

19. The roots of the equation $\begin{vmatrix} 3x^2 & x^2 + x\cos^2\beta & x^2 + x\cos\beta + \cos^2\beta \\ x^2 + x\cos x + \cos^2 x & 3\cos^2\beta & 1+(\sin 2\beta)/2 \\ x^2 + x\sin\beta + \sin^2\beta & 1+(\sin 2\beta)/2 & 3\sin^2\beta \end{vmatrix} = 0$

(a) sin β , $\cos^2$ β (b) $\sin^2$β, $\cos^2$β (c) $\sin^2$β, cos β (d) sinβ, cos β

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

(a) $\frac{1}{5}$ (b) 5 (c) 5^2 (d) 1

21. Consider the set A of all determinants of order 3 with entries 0 or 1. Let, B be the subset of A consisting of all determinants with value 1. Let C be the subset of A consisting of all determinants with value -1 then

(a) C is empty
(b) B has as many elements as C
(c) A = B UC
(d) B has twice as many elements as C.

22. Let a, b, c be the real numbers. Then following system of equations in x, y and z

$\frac{x^2}{a^2}+\frac{y^2}{b^2}-\frac{z^2}{c^2}=1$, $\frac{x^2}{a^2}-\frac{y^2}{b^2}+\frac{z^2}{c^2}=1$, $-\frac{x^2}{a^2}+\frac{y^2}{b^2}+\frac{z^2}{c^2}=1$ has

(a) No solution (b) unique solution
(c) infinitely many solutions (d) finitely many solutions.

23. 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 $f(100)$ equals

(a) 0 (b) 1 (c) 100 (d) -100

24. If the system of equations x-ky –z = 0, kx –y- z = 0, x +y-z =0 has a non-zero solution, then possible value of k are

(a) -1, 2 (b) 1, 2 (c) 0, 1 (d) -1, 1

25. The no. 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 $-\frac{\pi}{4} \le x \le \frac{\pi}{4}$ is

(a) 0 (b) 2 (c) 1 (d) 3

26. 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

27.If A = $\begin{bmatrix} \alpha & 2 \\ 2 & \alpha \end{bmatrix}$ and $|A^3|$ =125 then the value of α is

(a) ± 1 (b) ± 2 (c) ± 3 (d) ± 5

28. If A = $\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 1 \\ 0 & -2 & 4 \end{bmatrix}$, 6 A^{-1} = A^2+ c A + d I, then (c, d) is

(a) (-11,6) (b) (-6,11) (c) (6,11) (d) (11,6)

29. Given that q^2-pr < 0, p > 0 the value of $\begin{vmatrix} p & q & px+qy \\ q & r & qx+ry \\ px+qy & qx+ry & 0 \end{vmatrix}$ is

(a) Zero (b) positive (c) negative (d) q^2 + pr

30. If x, y, z are integers in A.P, lying between 1 and 9, and x^{51}, y^{41} and z^{31} are three digits numbers then the value of $\begin{vmatrix} 5 & 4 & 3 \\ x^{51} & y^{41} & z^{31} \\ x & y & z \end{vmatrix}$ is

(a) x + y + z (b) x- y + z (c) 0 (d) x + 2y + z

31. In a third order determinant a_{ij} denotes the element in the *i*th row and the *j*th column.

If $a_{ij}=\begin{cases} 0, & i=j \\ 1, & i>j \\ -1, & i<j \end{cases}$ then the value of the determinant

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

32. The value of the determinant $\begin{vmatrix} 1 & e^{i\pi/3} & e^{i\pi/4} \\ e^{-i\pi/3} & 1 & e^{2i\pi/3} \\ e^{-i\pi/4} & e^{-2i\pi/3} & 1 \end{vmatrix}$ is

(a) $2+\sqrt{2}$ (b) – (2+ $\sqrt{2}$) (c) – 2+ $\sqrt{3}$ (d) 2- $\sqrt{3}$

33. If $\begin{vmatrix} \alpha & x & x & x \\ x & \beta & x & x \\ x & x & \gamma & x \\ x & x & x & \delta \end{vmatrix}$ = *f(x)- xf'(x) then f(x) is equal to*

(a) (x – α) (x –β) (x-γ) (x –δ) (b) (x- α)(x +β) (x + γ) (x +δ)
(c) 2 (x –α) (x-β) (x-γ) (x-δ) (d) none of these

34. $\begin{vmatrix} x+1 & x+2 & x+\lambda \\ x+2 & x+3 & x+\mu \\ x+3 & x+3 & x+\nu \end{vmatrix} = 0$ where λ , u ,v are in A.P is

(a) an equation whose all roots are real (b) an identity in x
(c) an equation with only one real root (d) none of these

35. If a, b, c are sides of a triangle and $\begin{vmatrix} a^2 & b^2 & c^2 \\ (a+1)^2 & (b+1)^2 & (c+1)^2 \\ (a-1)^2 & (b-1)^2 & (c-1)^2 \end{vmatrix} = 0$, then

(a) Δ ABC is an equilateral triangle (b) ΔABC is a right angled isosceles triangle
(c) Δ ABC is an isosceles triangle (d) None of these

36. 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) none of these

37. If $f(x) = \begin{vmatrix} 1 & x & x+1 \\ 2x & x(x-1) & x(x+1) \\ 3x(x-1) & x(x-1)(x-2) & x(x^2-1) \end{vmatrix}$ then f (200) is equal to

(a) 1 (b) 0 (c) 200 (d) -200

38. Using the factor theorem it is found that b + c , c + a and a + b are three factors of the determinant $\begin{vmatrix} -2a & a+b & a+c \\ b+a & -2b & b+c \\ c+a & c+b & -2c \end{vmatrix}$ The other factor in the value of the determinant is

(a) 4 (b) 2 (c) a + b +c (d) none of these

39. If the determinant $\begin{vmatrix} \cos 2x & \sin^2 x & \cos^2 x \\ \sin^2 x & \cos 2x & \cos^2 x \\ \cos 4x & \cos^2 x & \cos 2x \end{vmatrix}$ is expanded in powers of sin x then the constant term in the expansion is (a) 1 (b) 2 (c) -1 (d) -2

40. The value of the determinant $\begin{vmatrix} \log_a(x/y) & \log_a(y/z) & \log_a(z/x) \\ \log_b(y/z) & \log_b(z/x) & \log_b(x/y) \\ \log_c(z/x) & \log_c(x/y) & \log_c(y/z) \end{vmatrix}$ is

(a) 1 (b) -1 (c) $\log_a xyz$ (d) none of these

41. If $\sqrt{-1}$ = i and ω is a non-real cube root of unity the value of

$\begin{vmatrix} 1 & \omega^2 & 1+i+\omega^2 \\ -i & -1 & -1-i+\omega \\ 1-i & \omega^2-1 & -1 \end{vmatrix}$ is equal to

(a) 1 (b) i (c) ω (d) 0

42. If A = $\begin{bmatrix} 1 & 1 & 0 \\ 1 & 2 & 1 \\ 2 & 1 & 0 \end{bmatrix}$, then characteristic equation of A is given by

(a) $A^3 + 3A^2 + I = 0$ (b) $A^3 - 3A^2 + I = 0$ (c) $A^3 - 3A^2 - 4I = 0$ (d) none of these

43. If the value of the determinant $\begin{vmatrix} a & 1 & 1 \\ 1 & b & 1 \\ 1 & 1 & c \end{vmatrix} > 0$, then

(a) abc >1 (b) abc > -8 (c) abc < -8 (d) abc > -2

44. Let f(x) = ax2+bx +c □ a, b, c ∈ R and the equation f(x) = x has imaginary roots α ,β and γ ,δ be the roots of

$f(f(x)) = x,$ then value of $\begin{vmatrix} 3 & \alpha & \delta \\ \beta & 0 & \alpha \\ \gamma & \beta & 1 \end{vmatrix}$ is

(a) 0 (b) purely real (c) purely imaginary (d) none of these

45. If A = $\begin{bmatrix} \cos x & \sin x & 0 \\ -\sin x & \cos x & 0 \\ 0 & 0 & 1 \end{bmatrix}$ = f(x) , then A^{-1} =

(a) f(-x) (b) f(x) (c) –f(x) (d) –f(-x)

46. Let A_α = $\begin{bmatrix} \cos\alpha & -\sin\alpha & 0 \\ \sin\alpha & \cos\alpha & 0 \\ 0 & 0 & 1 \end{bmatrix}$, then

(a) $A_{\alpha+\beta} = A_\alpha A_\beta$ (b) $A_\alpha^{-1} = A_\alpha$ (c) $A_\alpha^{-1} = -A_\alpha$ (d) none of these

47. If sin 2x =1, then $\begin{vmatrix} 0 & \cos x & -\sin x \\ \sin x & 0 & \cos x \\ \cos x & \sin x & 0 \end{vmatrix}^2$ equal

(a) 0 (b) 3/2 (c) 2/ 3 (d) none of these

48. If A and B are square matrices of equal degree, then which one is correct among the following ?

(a) A+B = B+A (b) A+B = A-B (c) A-B =B-A (d) AB = BA

49. If A = $\begin{bmatrix} \alpha & 0 \\ 1 & 1 \end{bmatrix}$ and B = $\begin{bmatrix} 1 & 0 \\ 5 & 1 \end{bmatrix}$, then value of α for which A^2 = B is

(a) 1 (b) -1 (c) 4 (d) no. real values

50. If D = $\begin{vmatrix} 1 & 1 & 1 \\ 1 & 1+x & 1 \\ 1 & 1 & 1+y \end{vmatrix}$ for x ≠ 0, y ≠ 0 then D is

(a) divisible by x but not y (b) divisible by y but not x
(c) divisible by neither x nor y (d) divisible by both x and y