



MATHS

BOOKS - SAI MATHS (TELUGU ENGLISH)

MATRICES

Problems

$$1. a(x) = \begin{vmatrix} 1 & 2 & 3 \\ x+1 & 2x+1 & 3x+1 \\ x^2+1 & 2x^2+1 & 3x^2+1 \end{vmatrix} \Rightarrow \int_0^1 A(x) dx =$$

A. 0

B. 1

C. 2

D. 4

Answer: A



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$$2. \text{ Let } \begin{vmatrix} 1+x & x & x^2 \\ x & 1+x & x^2 \\ x^2 & x & 1+x \end{vmatrix} = ax^5 + bx^4 + cx^3 + dx^2 + \lambda x + \mu$$

be an identity in x , where a, b, c, λ, μ are independent of x . Then, the value of λ is

A. 29

B. 24

C. 16

D. 9

Answer: A



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3. The system of equation

$$4x + y + 2z = 5$$

$$x - 5y + 3z = 10$$

$$9x - 3y + 7z = 20 \text{ has}$$

- A. no solution
- B. unique solution
- C. two solution
- D. infinite number of solutions

Answer: D



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

- A. abc
- B. $a + b + c$
- C. 0
- D. $ab + bc + ca$

Answer: C



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5. If A is square matrix of order 3, then $|Adj(AdjA^2)| =$

A. $|A|^2$

B. $|A|^4$

C. $|A|^8$

D. $|A|^{16}$

Answer: C



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

A. Unique solution

B. no solution

C. Infinite solutions

D. none of these

Answer: B



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7. If $A = \begin{bmatrix} a + ib & c + id \\ -c + id & a - ib \end{bmatrix}$, $a^2 + b^2 + c^2 + d^2 = 1$, then find inverse of A.

A. $\begin{bmatrix} a + jb & -c - id \\ c - id & a - ib \end{bmatrix}$

B. $\begin{bmatrix} a - ib & c + id \\ -cid & a - ib \end{bmatrix}$

C. $\begin{bmatrix} a - b & -c - id \\ c - id & a + ib \end{bmatrix}$

D. $\begin{bmatrix} a + ib & c + id \\ c - id & a - ib \end{bmatrix}$

Answer: C



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8. If the matrix $A = \begin{vmatrix} 1 & 2 & 3 & 0 \\ 2 & 4 & 3 & 2 \\ 3 & 2 & 1 & 3 \\ 6 & 8 & 7 & \alpha \end{vmatrix}$ is of rank 3, then α equals to

A. -5

B. 5

C. 4

D. 1

Answer: B

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9. If $k > 1$, and the determinant of the matrix A^2 , where

$$A = \begin{bmatrix} k & k\alpha & \alpha \\ 0 & \alpha & k\alpha \\ 0 & 0 & k \end{bmatrix} \text{ is } k^2 \text{ then } |\alpha| =$$

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

B. k

C. k^2

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

Answer: D



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10. If I is the identity matrix of order 2 and $A = \begin{bmatrix} 1 & 1 \\ 0 & 1 \end{bmatrix}$, then for $n \geq 1$, mathematical induction gives,

A. $A^n = nA - (n - 1)I$

B. $A^n = nA + (n - 1)I$

C. $A^n = 2^n A - (n + 1)I$

D. $A^n = 2^{n-1} A - (n - 1)I$

Answer: A



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11. If $A = \begin{bmatrix} -8 & 5 \\ 2 & 4 \end{bmatrix}$ satisfies the equation $f(x) = x^2 + 4x - p = 0$ then $p =$

A. 64

B. 42

C. 36

D. 24

Answer: B



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12. $\begin{vmatrix} x + 2 & x + 3 & x + 5 \\ x + 4 & x + 6 & x + 9 \\ x + 8 & x + 11 & x + 15 \end{vmatrix} =$

A. $3x^2 + 4x + 5$

B. $x^3 + 8x + 2$

C. 0

D. -2

Answer: D



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13. The system of equations $3x + 2y + z = 6$, $3x + 4y + 3z = 14$, $6x + 10y + 8z = a$ has infinite number of solutions if $a =$

A. 8

B. 12

C. 24

D. 36

Answer: D



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14. The number of real values of t such that the system of homogeneous equations

$$tx + (t + 1)y + (t - 1)z = 0, (t + 1)x + ty + (t + 2)z = 0, (t - 1)x + (t + 1)y + (t + 2)z = 0,$$

has non trivial solutions is

A. 3

B. 2

C. 1

D. 4

Answer: C



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15. $A = \begin{bmatrix} i & -i \\ -i & i \end{bmatrix}, B = \begin{bmatrix} 1 & -1 \\ -1 & 1 \end{bmatrix} \Rightarrow A^8 =$

A. 4B

B. 8B

C. 64B

D. 128B

Answer: D



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16.

$$f(x) = \left| \begin{array}{ccc} 1 & x & x + 1 \\ 2x & x(x - 1) & x(x + 1) \\ 3x(x - 1) & x(x - 1)(x - 2) & (x - 1)x(x + 1) \end{array} \right| \Rightarrow f(2012) =$$

A. 0

B. 1

C. -500

D. 500

Answer: A



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17. If $A = \begin{bmatrix} -1 & -2 & -3 \\ 4 & 4 & 3 \\ 4 & 5 & 6 \end{bmatrix}$, find its rank

- A. 1
- B. 2
- C. 3
- D. none

Answer: C



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18. Given that, $a\alpha^2 + c \neq 0$ and that the system of equations

$$(a\alpha + b)x + ay + bz = 0,$$

$$(b\alpha + c)x + by + cz = 0,$$

$$(a\alpha + b)y + (b\alpha + c)z = 0$$

has a non-trivial solution, then a, b, and c lie in

A. Arithmetic progression

B. Geometric progression

C. Harmonic progression

D. Arithmetico-geometric progression

Answer: B

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$$19. A(\alpha, \beta) = \begin{pmatrix} \cos \alpha & \sin \alpha & 0 \\ -\sin \alpha & \cos \alpha & 0 \\ 0 & 0 & e^\beta \end{pmatrix} = [A(\alpha, \beta)]^{-1} =$$

A. $A(-\alpha, \beta)$

B. $A(-\alpha, -\beta)$

C. $A(\alpha, -\beta)$

D. $A(\alpha, \beta)$

Answer: B

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20. If A is a matrix such that $\begin{pmatrix} 2 & 1 \\ 3 & 2 \end{pmatrix} A \begin{pmatrix} 1 & 1 \end{pmatrix} = \begin{pmatrix} 1 & 1 \\ 0 & 0 \end{pmatrix}$ then $A =$

A. $\begin{bmatrix} 1 & 1 \\ 0 & 1 \end{bmatrix}$

B. $[21]$

C. $\begin{bmatrix} 1 & 0 \\ -1 & 1 \end{bmatrix}$

D. $\begin{bmatrix} 2 \\ -3 \end{bmatrix}$

Answer: B

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21. $A = \begin{bmatrix} 1 & 1 & 1 \\ 0 & 0 & 0 \\ 1 & 1 & 0 \end{bmatrix} \Rightarrow A^2 - 2A =$

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$$22. \begin{vmatrix} 24 & 25 & 26 \\ 25 & 26 & 27 \\ 26 & 27 & 27 \end{vmatrix} =$$

A. 0

B. -1

C. 1

D. 2

Answer: A



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$$23. f(x) = \begin{vmatrix} 2 \cos x & 1 & 0 \\ x - \frac{\pi}{2} & 2 \cos x & 1 \\ 0 & 1 & 2 \cos x \end{vmatrix} \Rightarrow f'(\pi) =$$

A. 0

B. 2

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

D. $\pi - 6$

Answer: B



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$$24. \begin{vmatrix} x & x^2 & 1 + x^3 \\ y & y^2 & 1 + y^3 \\ z & z^2 & 1 + z^3 \end{vmatrix} = 0, x \neq y \neq z \Rightarrow 1 + xyz =$$

A. 0

B. -1

C. 1

D. 2

Answer: A



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25. If the system of equations

$$(k + 1)^3x + (k + 2)^3y = (k + 3)^2, (k + 1)x + (k + 2)y + k + 3, x + y =$$

is consistent then the value of k is

A. 2

B. -2

C. -1

D. 1

Answer: B



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26. If A is a nonzero square matrix of order n with $\det(I + A) \neq 0$ and

$A^3 = O$ where I, O are unit and null matrices of order $n \times n$ respectively

then $(I + A)^{-1} =$

A. $I - A + A^2$

B. $I + A + A^2$

C. $I + A^{-1}$

D. $I + A$

Answer: A



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27. Suppose A and B are two square matrices of same order. If A, B are symmetric matrices, then $AB - BA$ is

A. a symmetric matrix

B. a skew-symmetric matrix

C. a null matrix

D. the identity matrix

Answer: B



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28. If one of the roots of $\begin{vmatrix} 3 & 5 & x \\ 7 & x & 7 \\ x & 5 & 3 \end{vmatrix} = 0$ is -10, then the other roots are

A. 3, 7

B. 4, 7

C. 3, 9

D. 3, 4

Answer: A:D

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29. If x, y, z are all positive and are the p th, q th and r th terms of a geometric progression respectively, then the value of the determinant

$$\begin{vmatrix} \log x & p & 1 \\ \log y & q & 1 \\ \log z & r & 1 \end{vmatrix} =$$

A. $\log xyz$

B. $(p - 1)(q - 1)(r - 1)$

C. pqr

D. 0

Answer: D



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30. If $\begin{vmatrix} 1 & -1 & x \\ 1 & x & 1 \\ x & -1 & 1 \end{vmatrix}$ has no inverse, then the real value of x is

A. 2

B. 3

C. 0

D. 1

Answer: D



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31. The inverse of the matrix $\begin{bmatrix} 7 & -3 & 3 \\ -1 & 1 & 0 \\ -1 & 0 & -1 \end{bmatrix}$ is

A. $\begin{bmatrix} 1 & 1 & 1 \\ 3 & 4 & 3 \\ 3 & 3 & 4 \end{bmatrix}$

B. $\begin{bmatrix} 1 & 3 & 1 \\ 4 & 3 & 8 \\ 3 & 4 & 1 \end{bmatrix}$

C. $\begin{bmatrix} 1 & 1 & 1 \\ 3 & 3 & 4 \\ 3 & 4 & 3 \end{bmatrix}$

D. $\begin{bmatrix} 1 & 3 & 3 \\ 1 & 4 & 3 \\ 1 & 3 & 4 \end{bmatrix}$

Answer: D

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

A. 0

B. $1 + b + c$

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

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

Answer: B



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33. If $A = \begin{pmatrix} 1 & -2 \\ 4 & 5 \end{pmatrix}$ and $f(t) = t^2 - 3t + 7$ then

$$f(A) + \begin{pmatrix} 3 & 6 \\ -12 & -9 \end{pmatrix} =$$

A. $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$

B. $\begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$

C. $\begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$

D. $\begin{bmatrix} 1 & 1 \\ 0 & 0 \end{bmatrix}$

Answer: B



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34. If $\begin{pmatrix} 1 & 2 & x \\ 4 & -1 & 7 \\ 2 & 4 & -6 \end{pmatrix}$ is a singular matrix, then $x =$

A. 0

B. 1

C. -3

D. 3

Answer: C



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35. If A is a square matrix such that $A(AdjA) = \begin{pmatrix} 4 & 0 & 0 \\ 0 & 4 & 0 \\ 0 & 0 & 4 \end{pmatrix}$ then \det
 $(AdjA) =$

A. 4

B. 16

C. 64

D. 256

Answer: B



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36. The number of nontrivial solutions of the system:

$$x - y + z = 0, x + 2y = 0, 2x + y + 3z = 0 \text{ is}$$

A. 0

B. 1

C. 2

D. 3

Answer: A



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37. $A = \begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & 2 \\ 2 & 2 & 1 \end{bmatrix}$, then $A^3 - 4A^2 - 6A$ is equal to

A. 0

B. A

C. $-A$

D. I

Answer: C



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38. If A is an invertible matrix of order n , then the determinant of $\text{adj } A$ is equal to

A. $|A|^n$

B. $|A|^{n+1}$

C. $|A|^{n-1}$

D. $|A|^{n+2}$

Answer: C



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39. $m[-3 \ 4] + n[4 \ -3] = [10 \ -11] \Rightarrow 3m + 7n =$

A. 3

B. 5

C. 10

D. 1

Answer: D



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40. $Adj \begin{bmatrix} 1 & 0 & 2 \\ -1 & 1 & -2 \\ 0 & 2 & 1 \end{bmatrix} = \begin{bmatrix} 5 & a & -2 \\ 1 & 1 & 0 \\ -2 & -2 & b \end{bmatrix} \Rightarrow [a \ b] =$

A. $[-41]$

B. $[-4 - 1]$

C. $[4, 1]$

D. $[4 - 1]$

Answer: C

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41. $A = \begin{bmatrix} -1 & 0 \\ 0 & 2 \end{bmatrix} \Rightarrow A^3 - A^2 =$

A. $2A$

B. $2I$

C. A

D. I

Answer: A

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42. The value of $\begin{vmatrix} 1990 & 1991 & 1992 \\ 1991 & 1992 & 1993 \\ 1992 & 1993 & 1994 \end{vmatrix}$ is

A. 1992

B. 1993

C. 1994

D. 0

Answer: D



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43. The rank of $\begin{bmatrix} 1 & -1 & 1 \\ 1 & 1 & -1 \\ -1 & 1 & 1 \end{bmatrix}$ is

A. 0

B. 1

C. 2

D. 3

Answer: C



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44. If $a \neq p, b \neq q, c \neq r$ and $\begin{vmatrix} b & b & c \\ p+a & q+b & 2c \\ a & b & r \end{vmatrix} = 0$ then $\frac{p}{p-a} + \frac{q}{q-b} + \frac{r}{r-c}$ is equal to

A. 0

B. 1

C. 2

D. 3

Answer: C



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45. The number of Solutions of the system of equations

$$2x + y - z = 7, x - 3y + 2z = 1, x + 4y - 3z = 5 \text{ is}$$

A. 0

B. 1

C. 2

D. 3

Answer: A



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46. If
$$\begin{vmatrix} \cos(A + B) & -\sin(A + B) & \cos 2B \\ \sin A & \cos A & \sin B \\ -\cos A & \sin A & \cos B \end{vmatrix} = 0,$$
 then B is equal to

A. $(2n + 1) \frac{\pi}{2}$

B. $(2n + 1)\pi$

C. $n\pi$

D. $2n\pi$

Answer: A



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47. If A, B are square matrices of order 3, A is non-Singular and $AB = 0$, then B is a

A. Null matrix

B. Non-singular matrix

C. Singular matrix

D. Unit matrix

Answer: C



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48. If $A = \begin{bmatrix} 1 & 0 & 1 \\ 2 & 1 & 0 \\ 3 & 2 & 1 \end{bmatrix}$ then $\det A$ is equal to

A. 2

B. 5

C. 3

D. 4

Answer: A



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49. If

$$x^2 + y^2 + z^2 \neq 0, x = cy + bz, y = az + cx, \text{ and } z = bx + ay, a^2 + b^2 + c^2 = 1$$

is equal to

A. 1

B. 2

C. $a + b + c$

D. $ab + bc + ca$

Answer: A



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50. If $A = \begin{bmatrix} 0 & 2 \\ -2 & 3 \end{bmatrix}$, $B = \begin{bmatrix} 0 & -1 \\ 2 & 2 \end{bmatrix}$ then $(BA)^T$ is equal to



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51. A square matrix (a_{ij}) where $a_{ij} = 0$ for $i \neq j$ and $a_{ij} = k$ (constant)

for $i = j$ is called

A. unit matrix

B. Scalar matrix

C. null matrix

D. diagonal matrix

Answer: B



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52. If $A = \begin{bmatrix} 0 & 2 \\ 3 & -4 \end{bmatrix}$, $kA = \begin{bmatrix} 0 & 3a \\ 2b & 24 \end{bmatrix}$ then the values of k, a, b are respectively.

A. $-6, 12, -18$

B. $-6, 4, 9$

C. $-6, -4, -9$

D. $-6, 12, 18$

Answer: C



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