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. 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

$4x + y + 2z = 5$

$x - 5y + 3z = 10$

$9x - 3y + 7z = 20$ 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 matric of order 3, then $\left|Adj\left(AdjA^2\right)\right| =$

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 $A = \begin{bmatrix} k & k\alpha & \alpha \\ 0 & \alpha & k\alpha \\ 0 & 0 & k \end{bmatrix}$ is k^2 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. $A^n = nA - (n-1)1$

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

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

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

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

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

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.

$$f(x) = \begin{vmatrix} 1 & x & x+1 \\ 2x & x(x-1) & x(x+1) \\ 3x(x-1) & x(x-1)(x-2) & (x-1)x(x+1) \end{vmatrix} \Rightarrow f(2012) =$$

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 peogression

B. Geometric progression

C. Harmonic progression

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

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 pth, qth and rth terms of a geometric progresion 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: $x - y + z = 0, x + 2y = 0, 2x + y + 3z = 0$ 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 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. $m[-3 \quad 4] + n[4 \quad -3] = [10 \quad -11] \Rightarrow 3m + 7n =$

A. 3

B. 5

C. 10

D. 1

Answer: D

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

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 $2x + y - z = 7, x - 3y + 2z = 1, x + 4y - 3z = 5$ 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-Signular 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

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

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 $\left(a_{ij}\right)$ 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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