MATHS

BOOKS - V PUBLICATION

DETERMINANT

Question Bank

1. Evaluate $\begin{vmatrix} 2 & 4 \\ -1 & 2 \end{vmatrix}$

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2. Evaluate $\begin{vmatrix} x & x+1 \\ x-1 & x \end{vmatrix}$

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3. Evaluate the determinant $\Delta = \begin{vmatrix} 1 & 2 & 4 \\ -1 & 3 & 0 \\ 4 & 1 & 0 \end{vmatrix}$

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4. Evaluate $\Delta = \begin{vmatrix} 0 & \sin\alpha & -\cos\alpha \\ -\sin\alpha & 0 & \sin\beta \\ \cos\alpha & -\sin\beta & 0 \end{vmatrix}$

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5. Find the values of x in which

$$\begin{vmatrix} 3 & x \\ x & 1 \end{vmatrix} = \begin{vmatrix} 3 & 2 \\ 4 & 1 \end{vmatrix}$$

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6. Evaluate $\begin{vmatrix} 2 & 4 \\ -5 & -1 \end{vmatrix}$

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7. Evaluate $\begin{vmatrix} \cos\theta & -\sin\theta \\ \sin\theta & \cos\theta \end{vmatrix}$

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8. If A = $\begin{bmatrix} 1 & 2 \\ 4 & 2 \end{bmatrix}$ then show that $|2A| = 4|A|$

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9. If $A = \begin{bmatrix} 1 & 0 & 1 \\ 0 & 1 & 2 \\ 0 & 0 & 4 \end{bmatrix}$ then show that $|3A| = 27|A|$

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10. Evaluate the determinants

(i) $\begin{vmatrix} 3 & -1 & -2 \\ 0 & 0 & -1 \\ 3 & -5 & 0 \end{vmatrix}$

(ii) $\begin{vmatrix} 3 & -4 & 5 \\ 1 & 1 & -2 \\ 2 & 3 & 1 \end{vmatrix}$

iii) $\begin{vmatrix} 0 & 1 & 2 \\ -1 & 0 & -3 \\ -2 & 3 & 0 \end{vmatrix}$

iv) $\begin{vmatrix} 2 & -1 & -2 \\ 0 & 2 & -1 \\ 3 & -5 & 0 \end{vmatrix}$

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11. If $A = \begin{bmatrix} 1 & 1 & -2 \\ 2 & 1 & -3 \\ 5 & 4 & -9 \end{bmatrix}$. Find |A|

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12. Find values of x if i) $\begin{vmatrix} 2 & 4 \\ 5 & 1 \end{vmatrix} = \begin{vmatrix} 2x & 4 \\ 6 & x \end{vmatrix}$ ii) $\begin{vmatrix} 2 & 3 \\ 4 & 5 \end{vmatrix} = \begin{vmatrix} x & 3 \\ 2x & 5 \end{vmatrix}$

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13. If $\begin{vmatrix} x & 2 \\ 18 & x \end{vmatrix} = \begin{vmatrix} 6 & 2 \\ 18 & 6 \end{vmatrix}$, then x is equal to a)6 b)± 6 c)-6 d)0

A. 6

B. '+- 6'

C. -6

D. 0

Answer: B

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14. Verify Property 1 for $\Delta = \begin{vmatrix} 2 & -3 & 5 \\ 6 & 0 & 4 \\ 1 & 5 & -7 \end{vmatrix}$

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15. Verify Property 2 for $\Delta = \begin{vmatrix} 2 & -3 & 5 \\ 6 & 0 & 4 \\ 1 & 5 & -7 \end{vmatrix}$

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16. Evaluate $\Delta = \begin{vmatrix} 3 & 2 & 3 \\ 2 & 2 & 3 \\ 3 & 2 & 3 \end{vmatrix}$

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17. Evaluate $\begin{vmatrix} 102 & 18 & 36 \\ 1 & 3 & 4 \\ 17 & 3 & 6 \end{vmatrix}$

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18. prove that $\begin{vmatrix} a & b & c \\ a+2x & b+2y & c+2z \\ x & y & z \end{vmatrix} = 0$

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19. Prove that $\begin{vmatrix} a & a+b & a+b+c \\ 2a & 3a+2b & 4a+3b+2c \\ 3a & 6a+3b & 10a+6b+3c \end{vmatrix} = a^3$

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20. Without expanding prove that

$$\begin{vmatrix} x+y & y+z & z+x \\ z & x & y \\ 1 & 1 & 1 \end{vmatrix} = 0$$

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21. Evaluate $\Delta = \begin{vmatrix} 1 & a & bc \\ 1 & b & ca \\ 1 & c & ab \end{vmatrix}$

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22. Using properties of determinants prove the following.

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

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23. Consider the determinant $\Delta = \begin{vmatrix} x & x^2 & 1+x^3 \\ y & y^2 & 1+y^3 \\ z & z^2 & 1+z^3 \end{vmatrix}$,

Where x,y,z are different.

Show that if $\Delta = 0$,then$1 + xyz = 0$

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24. Using properties of determinants show that

$$\begin{vmatrix} 1+a & 1 & 1 \\ 1 & 1+b & 1 \\ 1 & 1 & 1+c \end{vmatrix} = abc\left(1 + \frac{1}{a} + \frac{1}{b} + \frac{1}{c}\right)$$

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25. Without expanding the determinant prove the following.

$$\begin{vmatrix} x & a & x+a \\ y & b & y+b \\ z & c & z+c \end{vmatrix} = 0$$

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26. Without expanding the determinant prove the following.

$$\begin{vmatrix} a-b & b-c & c-a \\ b-c & c-a & a-b \\ c-a & a-b & b-c \end{vmatrix} = 0$$

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27. Evaluate $\begin{vmatrix} 2 & 7 & 65 \\ 3 & 8 & 75 \\ 5 & 9 & 86 \end{vmatrix} = 0$

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28. prove $\begin{vmatrix} 1 & bc & a(b+c) \\ 1 & ca & b(c+a) \\ 1 & ab & c(a+b) \end{vmatrix} = 0$

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29. Without expanding the determinant prove the following.

$$\begin{vmatrix} b+c & q+r & y+z \\ c+a & r+p & z+x \\ a+b & p+q & x+y \end{vmatrix} = 2\begin{vmatrix} a & p & x \\ b & q & y \\ c & r & z \end{vmatrix}$$

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30. By using properties of determinants, prove that

$$\begin{vmatrix} 0 & a & -b \\ -a & 0 & -c \\ b & c & 0 \end{vmatrix} = 0$$

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31. By using properties of determinants, prove that

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

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32. Show that

$$\begin{vmatrix} 1 & a & a^2 \\ 1 & b & b^2 \\ 1 & c & c^2 \end{vmatrix} = (a-b)(b-c)(c-a)$$

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33. By using properties of determinants, prove that

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

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34. Prove that

$$\begin{vmatrix} y+k & y & y \\ y & y+k & y \\ y & y & y+k \end{vmatrix} = k^2(3y+k)$$

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35. By using properties of determinants, prove that

$$\begin{vmatrix} x+y+2z & x & y \\ z & y+z+2x & y \\ z & x & z+x+2y \end{vmatrix} = 2(x+y+z)^3$$

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36. Using properties of determinants prove the following.

$$\begin{vmatrix} 1 & x & x^2 \\ x^2 & 1 & x \\ x & x^2 & 1 \end{vmatrix} = \left(1 - x^3\right)^2$$

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37. Prove

$$\begin{vmatrix} 1+a^2-b^2 & 2ab & -2b \\ 2ab & 1-a^2+b^2 & 2a \\ 2b & -2a & 1-a^2-b^2 \end{vmatrix} = \left(1+a^2+b^2\right)^3$$

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38. By using the properties of determinants,prove that

$$\begin{vmatrix} a^2+1 & ab & ac \\ ab & b^2+1 & bc \\ ca & cb & c^2+1 \end{vmatrix} = 1 + a^2 + b^2 + c^2$$

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39. Let A be a square matrix of order 2x2

then $|KA|$ is equal to

A. k|[A]|'

B. k^2|[A]|'

C. k^3|[A]|'

D. 3 k|[A]|'

Answer: C

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40. Which of the following is correct?

a)Determinant is a square matrix

b)Determinant is a number associated to a matrix.

c)Determinant is a number associated to a square matrix

d)None of these

A. Determinant is a square matrix.

B. Deṭerminant iș a number ạssociated to a matrix.

C. Determinant is a number associated to a squarematrix.

D. Noné of these

Answer: C

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41. Find the area of the triangle whose vertices are $(3, 8), (-4, 2)$and $(5, 1)$

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42. Find the equation of the line joining A(1,3) and B(0,0) using determinants and k is D (k,0)is a points such that area of triangle ABD is 3 sq.unit.

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43. Find the area of the triangle with vertices at

(1,0),(6,0),(4,3) using determinants.

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44. Using the property of determinants,show

that the points $A(a, b+c), B(b, c+a), C(c, a+b)$ are

collinear.

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45. Find the values of k if area of triangle is 4 sq. units and

vertices are

(k,0),(4,0),(0,2)

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46. Find the equation of line joining (1,2) and (3,6) using determinants.

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47. If area of triangle is 35 sq. units with vertices (2,-6), (5,4) and (k,4). Then k is____

A. 12

B. -2

C. -12,-2

D. 12,-2

Answer: D

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48. Find the minor of 1 in the determinant $\Delta = \begin{vmatrix} 3 & 4 & 5 \\ 2 & 7 & 1 \\ 9 & 2 & 6 \end{vmatrix}$

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49. Find minors of element 6 in the determinant

$$\Delta = \begin{vmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{vmatrix}$$

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50. Find minors and cofactors of the elements of the determinant $\begin{vmatrix} 1 & -2 \\ 4 & 3 \end{vmatrix}$

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51. Find minors and cofactors of the elements a_{11}, a_{21} in the determinant $\Delta = \begin{vmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{vmatrix}$

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52. Find minors and cofactors of the elements of the determinant $\begin{vmatrix} 2 & -3 & 5 \\ 6 & 0 & 4 \\ 1 & 5 & -7 \end{vmatrix}$ and verify that $a_{11}A_{31} + a_{12}A_{32} + a_{13}A_{33} = 0$

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53. Write Minors and Cofactors of the elements of following determinants: i) $\begin{vmatrix} 2 & -4 \\ 0 & 3 \end{vmatrix}$|ii) $\begin{vmatrix} a & c \\ b & d \end{vmatrix}$

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54. Using cofactors of element of second row evaluate $\Delta = \begin{vmatrix} 5 & 3 & 8 \\ 2 & 0 & 1 \\ 1 & 2 & 3 \end{vmatrix}$

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55. Using co-factors of elements of third column,

evaluate $\Delta = \begin{vmatrix} 1 & x & yz \\ 1 & y & zx \\ 1 & z & xy \end{vmatrix}$

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56. If $\Delta = \begin{vmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{vmatrix}$ and A_{ij} is cofactors of a_{ij}, then value of Δ is given by

i) $a_{11}A_{31} + a_{12}A_{32} + a_{13}A_{33}$

ii) $a_{11}A_{11} + a_{12}A_{21} + a_{13}A_{31}$

iii) $a_{21}A_{11} + a_{22}A_{12} + a_{23}A_{13}$

iv) $a_{11}A_{11} + a_{21}A_{21} + a_{31}A_{31}$

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57. If $A = \begin{bmatrix} 2 & 3 \\ 1 & -4 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & -2 \\ -1 & 3 \end{bmatrix}$, then verify that $(AB)^{-1} = B^{-1}A^{-1}$

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58. Show that the matrix $A = \begin{bmatrix} 2 & 3 \\ 1 & 2 \end{bmatrix}$ Satisfies the equation $A^2 - 4A + I = O$, where I is 2×2 identity matrix and O is 2×2 zero matrix. Using this equation, find A^{-1}

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59. Find the adjoint of each of the matrices $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$

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60. Find the adjoint of the matrix $\begin{bmatrix} 1 & -1 & 2 \\ 2 & 3 & 5 \\ -2 & 0 & 1 \end{bmatrix}$

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61. Verify A (adj A)=(adj A)A=|A|I in the following matrices.

$$\begin{bmatrix} 2 & 3 \\ -4 & -6 \end{bmatrix}$$

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62. Find the inverse of the following matrics.

$$\begin{bmatrix} 2 & -2 \\ 4 & 3 \end{bmatrix}$$

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63. Find the inverse of the following matrics.

$$\begin{bmatrix} -1 & 5 \\ -3 & 2 \end{bmatrix}$$

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64. Find the inverse of each of the matrices

$$\begin{bmatrix} 1 & 2 & 3 \\ 0 & 2 & 4 \\ 0 & 0 & 5 \end{bmatrix}$$

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65. Find the inverse of the following

$$A = \begin{bmatrix} 1 & 0 & 0 \\ 3 & 3 & 0 \\ 5 & 2 & -1 \end{bmatrix}$$

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66. Find the inverse of each of the matrices

$$\begin{bmatrix} 2 & 1 & 3 \\ 4 & -1 & 0 \\ -7 & 2 & 1 \end{bmatrix}$$

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67. Find the inverse of the following

$$A = \begin{bmatrix} 1 & -1 & 2 \\ 0 & 2 & -3 \\ 3 & -2 & 4 \end{bmatrix}$$

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68. Find the inverse of each of the matrices.

$$\begin{bmatrix} 1 & 0 & 0 \\ 0 & \cos\alpha & \sin\alpha \\ 0 & \sin\alpha & -\cos\alpha \end{bmatrix}$$

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69. Let $A = \begin{bmatrix} 3 & 7 \\ 2 & 5 \end{bmatrix}$ and $B = \begin{bmatrix} 6 & 8 \\ 7 & 9 \end{bmatrix}$ Verify that $(AB)^{-1} = B^{-1}A^{-1}$

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70. If A = $\begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix}$,show that $A^2 - 5A + 7I = 0$ Hence, find A^{-1}

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71. For the matrix A= $\begin{bmatrix} 3 & 2 \\ 1 & 1 \end{bmatrix}$,find the numbers a and b such that $A^2 + aA + bI = 0$

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72. For the matrix A= $\begin{bmatrix} 1 & 1 & 1 \\ 1 & 2 & -3 \\ 2 & -1 & 3 \end{bmatrix}$ show that $A^3 - 6A^2 + 5A + 11I = 0$. Hence, find A^{-1}

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73. Let A be a non-singular square matrix of order 3×3 .Then |adj A| is ...

A. |[A]|

B. [.A|[^2.'

C. |[A|[^3'

D. 3|[A]|

Answer: B

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74. If A is an invertible matrix of order 2, then det(A^{-1})=

A. def (A)

B. 1det(A)'

C. I

D. O

Answer: B

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75. Solve the system of equations

'2 x+5 y=1'

'3 x+2 y=7'

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76. If $A = \begin{bmatrix} 3 & -2 & 3 \\ 2 & 1 & -1 \\ 4 & -3 & 2 \end{bmatrix}$

Solve the linear equations

$3x - 2y + 3z = 8$

$2x + y - z = 1$

$4x - 3y + 2z = 4$

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77. The sum of three numbers is 6 . If we multiply third number by3 ańd add second number to it, we get 11 , By adding first and third numbers, We get double of the second number. Represent it algebraically and find the numbers using matrix method.

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78. classify the following system of equations as consistent or inconsistent $x+2y=2, 2x+3y=3$

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79. Examine the consistency of the following system of equation

2x-y =5

x+y=4

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80. classify the following system of equations as consistent or inconsistent $x + 3y = 5, 2x + 6y = 8$

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81. Examine the consistency of the following system of equation

x+y+z=1

2x +3y+2z =2

ax +ay +2az =4

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82. Examine the consistency of the system of equations

$5x - y + 4z = 5, 2x + 3y + 5z = 2, 5x - 2y + 6z = -1$

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83. Solve the following system of linear equations using matrix method.

5x+2y=4

7x+3y=5

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84. Solve the following system of linear equations using matrix method.

2x-y=-2

3x+4y=3

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85. Solve the following system of linear equations using matrix method.

4x-3y=3

3x-5y=7

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86. Solve the following system of linear

Equations,using matrix method,

$5x + 2y = 3,3x + 2y = 5$

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87. Solve the system of equations using matrix method.

$$2x + y + z = 1, x - 2y - z = \frac{3}{2}, 3y - 5z = 9$$

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88. Let $A = \begin{bmatrix} 1 & -1 & 1 \\ 2 & 1 & -3 \\ 1 & 1 & 1 \end{bmatrix}$

Using A^-1 solve the system of

equations

$x - y + z = 4$

$2x + y - 3z = 0$

$x + y + z = 2$

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89. If $A = \begin{bmatrix} 2 & -3 & 5 \\ 3 & 2 & -4 \\ 1 & 1 & -2 \end{bmatrix}$, find A^{-1}. Using A^{-1} solve the system of equations.

$2x - 3y + 5z = 11, 3x + 2y - 4z = -5, x + y - 2z = -3$

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90. The cost of $4kg$ onion, $3kg$ wheat and $2kg$ rice is $Rs. 60$. The cost of $2kg$ onion, $4kg$ wheat and $6kg$ rice is $Rs. 90$. The cost of $6kg$ onion, $2kg$ wheat and $3kg$ rice is $Rs. 70$. Find cost of each item per kg by matrix method.

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91. If a, b, c are positive and unequal show that value of the determinant $\Delta = \begin{vmatrix} a & b & c \\ b & c & a \\ c & a & b \end{vmatrix}$ is negative.

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92. Show that

$$\Delta = \begin{vmatrix} (y+z)^2 & xy & zx \\ xy & (x+z)^2 & yz \\ xz & yz & (x+y)^2 \end{vmatrix} = 2xyz(x+y+z)^3$$

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93. if

$$A = \begin{bmatrix} 1 & -1 & 2 \\ 0 & 2 & -3 \\ 3 & -2 & 4 \end{bmatrix} B = \begin{bmatrix} -2 & 0 & 1 \\ 9 & 2 & -3 \\ 6 & 1 & -2 \end{bmatrix}$$

Using

A^{-1} solve the system of linear equation given below: x-y+2z=1, 2y-3z=1, 3x-2y+4z=2

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94. Prove that

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

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95. Prove that $\begin{vmatrix} x & \sin\theta & \cos\theta \\ -\sin\theta & -x & 1 \\ \cos\theta & 1 & x \end{vmatrix}$ is independent of θ

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96. Without expanding the determinant,

Prove that $\begin{vmatrix} a & a^2 & bc \\ b & b^2 & ca \\ c & c^2 & ab \end{vmatrix} = \begin{vmatrix} 1 & a^2 & a^3 \\ 1 & b^2 & b^3 \\ 1 & c^2 & c^3 \end{vmatrix}$

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97. Evaluate $\begin{vmatrix} \cos\alpha\cos\beta & \cos\alpha\sin\beta & -\sin\alpha \\ -\sin\beta & \cos\beta & 0 \\ \sin\alpha\cos\beta & \sin\alpha\sin\beta & \cos\alpha \end{vmatrix}$

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98. If a,b,c are real numbers and $\begin{vmatrix} b+c & c+a & a+b \\ c+a & a+b & b+c \\ a+b & b+c & c+a \end{vmatrix} = 0$,show that a=b=c

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99. Solve the equation $\begin{vmatrix} x+a & x & x \\ x & x+a & x \\ x & x & x+a \end{vmatrix} = 0, a \neq 0$

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100. Prove that $\begin{vmatrix} a^2 & bc & ac+c^2 \\ a^2+ab & b^2 & ac \\ ab & b^2+bc & c^2 \end{vmatrix} = 4a^2b^2c^2$

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101. If $A^{-1}=\begin{bmatrix}3&-1&1\\-15&6&-5\\5&-2&2\end{bmatrix}$ and $B=\begin{bmatrix}1&2&-2\\-1&3&0\\0&-2&1\end{bmatrix}$ find $(AB)^{-1}$

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102. Let $A=\begin{bmatrix}1&-2&1\\-2&3&1\\1&1&5\end{bmatrix}$ verify that $\left(A^{-1}\right)^{-1}=A$

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103. Evaluate $\begin{vmatrix}x&y&x+y\\y&x+y&x\\x+y&x&y\end{vmatrix}$

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104. evaluate $\begin{vmatrix} 1 & x & y \\ 1 & x+y & y \\ 1 & x & x+y \end{vmatrix}$

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105. Using properties of determinants, prove that

$$\begin{vmatrix} \alpha & \alpha^2 & \beta+\gamma \\ \beta & \beta^2 & \gamma+\alpha \\ \gamma & \gamma^2 & \alpha+\beta \end{vmatrix} = (\beta-\gamma)(\gamma-\alpha)(\alpha-\beta)(\alpha+\beta+\gamma)$$

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106. Using properties of determinants, prove that

$\begin{vmatrix} 3a & -a+b & -a+c \\ -b+a & 3b & -b+c \\ -c+a & -c+b & 3c \end{vmatrix}$ = 3(a+b+c)(ab+bc+ca)

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107. Using properties of determinants, prove that

$$\begin{vmatrix} 1 & 1+p & 1+p+q \\ 2 & 3+2p & 4+3p+2q \\ 3 & 6+3p & 10+6p+3q \end{vmatrix} = 1$$

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108. Using properties of determinants, prove that

$$\begin{vmatrix} \sin\alpha & \cos\alpha & \cos(\alpha+\delta) \\ \sin\beta & \cos\beta & \cos(\beta+\delta) \\ \sin\gamma & \cos\gamma & \cos(\gamma+\delta) \end{vmatrix} = 0$$

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109. Consider a system of linear equations

which is given below,

$$\frac{2}{x}+\frac{3}{y}+\frac{10}{z}=4, \frac{4}{x}-\frac{6}{y}+\frac{5}{z}=1,$$
$$\frac{6}{x}+\frac{9}{y}-\frac{20}{z}=2$$

Find x,y and z.

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110. If a,b,c are in A.P., then the determinant

$$\begin{vmatrix} x+2 & x+3 & x+2a \\ x+3 & x+4 & x+2b \\ x+4 & x+5 & x+2c \end{vmatrix}$$ is

If a, b, c are in A.P., then

$a+c=2b$

A. 0

B. 1

C. x

D. 2x

Answer: A

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111. If x, y, z are non zero real numbers, then find the inverse of matrix $A = \begin{bmatrix} x & 0 & 0 \\ 0 & y & 0 \\ 0 & 0 & z \end{bmatrix}$.

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112. Let A = $\begin{bmatrix} 1 & \sin\theta & 1 \\ -\sin\theta & 1 & \sin\theta \\ -1 & -\sin\theta & 1 \end{bmatrix}$, where $0 \leq \theta \leq 2\pi$

Then

A. Det '(A)=0'

B. Det '(A) in(2, alpha)'.

C. Det '(A) in(2,4)'

D. Det '(A) in[2,-4]'

Answer: C

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113. If $A(x_1, y_1)$, $B(x_2, y_2)$ and $C(x_3, y_3)$ are vertices of an equilateral triangle whose each side is equal to 'a', then prove that, $\begin{vmatrix} x_1 & y_1 & 2 \\ x_2 & y_2 & 2 \\ x_3 & y_3 & 2 \end{vmatrix}^2 = 3a^4$

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114. Solve the following system of equations using matrix method. $2x + 5y = 1, 3x + 2y = 7$

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115. If $\begin{bmatrix} 2 & 5 \\ -3 & 7 \end{bmatrix} \times A = \begin{bmatrix} 17 & -1 \\ 47 & -13 \end{bmatrix}$ then

Find the 2x2 matrix A.

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116. Let $A = \begin{bmatrix} 1 & 4 & 0 \\ -1 & 2 & 2 \\ 0 & 0 & 2 \end{bmatrix}$ i) is A singular?

ii) Find $adjA$

iii) Find A^{-1} using $adjA$ and $|A|$

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117. Solve the following system of equations using matrix method. $2x + 5y = 1, 3x + 2y = 7$

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118. Find the minors and cofactors of a_{11}, a_{12} and a_{13} of the matrix $A = \begin{bmatrix} 1 & -1 & 3 \\ 2 & 2 & -1 \\ -1 & 3 & 5 \end{bmatrix}$

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119. Let $|A| = \begin{vmatrix} x_1 & x_2 & x_3 \\ y_1 & y_2 & y_3 \\ z_1 & z_2 & z_3 \end{vmatrix}$.Expand $|A|$ along the first row

and

along the first column. Comment on the two results.

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120. Evaluate the determinant of $A = \begin{bmatrix} 3 & -1 & 2 \\ 1 & 2 & -1 \\ 4 & 0 & 5 \end{bmatrix}$

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121. Evaluate the determinant $\begin{vmatrix} 27 & 2 & 3 \\ 45 & 5 & 5 \\ 36 & 9 & 4 \end{vmatrix}$

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122. Find the value of the determinant $\begin{vmatrix} 1 & a & b+c \\ 1 & b & c+a \\ 1 & c & a+b \end{vmatrix}$

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123. Find the area of a triangle whose vertices are $(-4, 1)$, $(5, -3)$ and $(2, 3)$.

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124. Evaluate the determinant of 'A=[[1, 2],[3, 4]]'

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125. Evaluate the determinant of $A = \begin{bmatrix} 1 & 3 & 2 \\ 2 & 0 & 1 \\ 3 & 4 & 3 \end{bmatrix}$

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126. Find the minors and co-factors of the elements 1,-3 and 4 in $\Delta = \begin{vmatrix} 2 & 1 & 0 \\ -3 & 5 & -2 \\ 6 & 9 & 4 \end{vmatrix}$

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127. Without expanding, evaluate $\begin{vmatrix} 2 & 1 & 5 \\ -3 & -1 & 4 \\ 6 & 2 & -8 \end{vmatrix}$

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128. Prove that

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

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129. Evaluate $\Delta = \begin{vmatrix} 1 & a & bc \\ 1 & b & ca \\ 1 & c & ab \end{vmatrix}$

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130. If $b \neq c$ and $\begin{vmatrix} a & a^2 & 1+a^3 \\ b & b^2 & 1+b^3 \\ c & c^2 & 1+c^3 \end{vmatrix} = 0$

then prove that $abc = -1$

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131. If a, b, c are in A.P show that

$$\begin{vmatrix} x+1 & x+2 & x+a \\ x+2 & x+3 & x+b \\ x+3 & x+4 & x+c \end{vmatrix} = 0$$

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132. If $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$, find A^{-1}

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133. If $A=\begin{bmatrix}1 & 1\\ 1 & 2\end{bmatrix}$, verify the $(adjA)^{-1}=adj(A^{-1})$

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134. Find inverse of the matrix $A=\begin{bmatrix}\cos\alpha & -\sin\alpha & 0\\ \sin\alpha & \cos\alpha & 0\\ 0 & 0 & 1\end{bmatrix}$

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135. For the matrices $A=\begin{bmatrix}-1 & 2\\ 3 & 4\end{bmatrix}$ and $B=\begin{bmatrix}2 & 5\\ 3 & 6\end{bmatrix}$, verify that $(AB)^{-1}=B^{-1}A^{-1}$?

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136. Show that

$$\begin{bmatrix} 1 & -\tan\theta \\ \tan\theta & 1 \end{bmatrix}\begin{bmatrix} 1 & \tan\theta \\ -\tan\theta & 1 \end{bmatrix}^{-1} = \begin{bmatrix} \cos 2\theta & -\sin 2\theta \\ \sin 2\theta & \cos 2\theta \end{bmatrix}$$

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