MATHS

BOOKS - KUMAR PRAKASHAN KENDRA MATHS (GUJRATI ENGLISH)

DETERMINANTS

Exercise 4 1

1. Evaluate the determinants below in examples number 1 and 2

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

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2. Evaluate the determinants below in examples number 1 and 2

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

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3. Evaluate the determinants below in examples number 1 and 2

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

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

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5. 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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6. Evaluate the following determinates

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

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7. Evaluate the following determinates

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

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8. Evaluate the following determinates

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

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9. Find values of x,if

(i) $\begin{vmatrix} 2 & 4 \\ 5 & 1 \end{vmatrix} = \begin{vmatrix} 2x & 4 \\ 6 & x \end{vmatrix}$

A. 1

B. $\therefore x = \pm \sqrt{2}$

C. $\therefore x = \pm \sqrt{3}$

D. 2

Answer: $\therefore x = \pm \sqrt{3}$

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10. If $\begin{vmatrix} x & 2 \\ 18 & x \end{vmatrix} = \begin{vmatrix} 6 & 2 \\ 18 & 6 \end{vmatrix}$ then x is qual to ....

A. 6

B. ± 6

C. -6

D. 0

Answer: B

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Exercise 4 2

1. Using the property of determinants andd without expanding in following exercises 1 to 7 prove that

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

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2. Using the property of determinants andd without expanding in following exercises 1 to 7 prove that

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

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3. Using the property of determinants andd without expanding in following exercises 1 to 7 prove that

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

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4. Using the property of determinants andd without expanding in following exercises 1 to 7 prove that

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

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5. Using the property of determinants andd without expanding in following exercises 1 to 7 prove that

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

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6. Using the property of determinants andd without expanding in following exercises 1 to 7 prove that

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

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7. Using the property of determinants andd without expanding in following exercises 1 to 7 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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8. Using the property of determinants andd without expanding in following exercises 1 to 7 prove 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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9. Using the property of determinants andd without expanding in following exercises 1 to 7 prove that

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

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10. Using the property of determinants andd without expanding in following exercises 1 to 7 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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11. Using the property of determinants andd without expanding in following exercises 1 to 7 prove that

$$\begin{vmatrix} x+4 & 2x & 2x \\ 2x & x+4 & 2x \\ 2x & 2x & x+4 \end{vmatrix} = (5x+4)(4-x)^2$$

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12. Using the property of determinants andd without expanding in following exercises 1 to 7 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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13. Using the property of determinants andd without expanding in following exercises 1 to 7 prove that

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

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14. Using the property of determinants andd without expanding in following exercises 1 to 7 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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15. Using the property of determinants andd without expanding in following exercises 1 to 7 prove that

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

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16. Using the property of determinants andd without expanding in following exercises 1 to 7 prove that

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

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17. Using the property of determinants andd without expanding in following exercises 1 to 7 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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18. Let A be a square matrix of order 3×3 then |KA| is equal to ......

A. K|A|

B. $K^2|A|$

C. $K^3|A|$

D. 3K|A|

Answer: c

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19. Which of the following is correct

A. Determinant is a square matrix

B. Determinant is a numbre associated to matirix

C. Determinant is a number associated to a square matrix

D. None of these

Answer: C

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Exercise 4 3

1. Find area of the triangle with vertices at the point given in each of the following

(1,0),(6,0),(4,3)

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2. Find area of the triangle with vertices at the point given in each of the following

(2,7),(1,1),10,8)

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3. Find area of the triangle with vertices at the point given in each of the following:

$(-2, -3), (3, 2), (-1, -8)$

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4. Show that points A(a,b+c),B(b,c+a) and C(c,a+b) are collinear

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5. Find values of k if area of triangle is 4sq. units and vertices are (k,0)(4,0),(0,2)

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6. Find values of k if area of triangle is 4sq. units and vertices are (-2,0)(0,.4),(0,k)

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7. Using determinants find equation of line passess from point (1,2) and (3,6)

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8. Using determinants find equation of line passess from point (3,1) and (9,3)

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9. If area of triangle is 35 sq. units with vertices $(2, -6), (5, 4)$ and $(k, 4)$, then $k = \ldots\ldots\ldots$

A. 12

B. -2

C. $-12, -2$

D. $12, -2$

Answer: D

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Exercise 4 4

1. Write Minors and Cofactors of the elments of following determinants :

$$\begin{vmatrix} 2 & -4 \\ 0 & 3 \end{vmatrix}$$

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2. Write Minors and Cofactors of the elments of following determinants :

$$\begin{vmatrix} a & c \\ b & d \end{vmatrix}$$

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3. Write Minors and Cofactors of the elments of following determinants :

$$\begin{vmatrix} 1 & 0 & 1 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{vmatrix}$$

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4. Write Minors and Cofactors of the elments of following determinants :

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

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5. Using Cofactors of elements of second row, evaluate $\Delta = \begin{vmatrix} 5 & 3 & 8 \\ 2 & 0 & 1 \\ 1 & 2 & 3 \end{vmatrix}$

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6. Using Cofactors of elements of third column , evaluate

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

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7. 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} Cofators of a_{ij} then value of Δ is given by ....

A. $a_{11}A_{31} + a_{12}A_{32} + a_{13}A_{33}$

B. $a_{11}A_{11} + a_{12}A_{21} + a_{13}A_{31}$

C. $a_{21}A_{11} + a_{22}A_{12} + a_{23}A_{31}$

D. $A_{11}A_{11} + a_{21}A_{21} + a_{31}A_{31}$

Answer: D

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Exercise 4 5

1. Find adjoint of each of the matrices in Exercises 1 and 2

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

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2. Find adjoint of each of the matrices in Exercises 1 and 2

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

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3. Verify A(adjA)=(adjA) A=|A| I in following examples (3) and (4)

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

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4. Verify A(adjA)=(adjA) A=|A| I in following examples (3) and (4)

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

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5. Find the inverse of each of the matrices (if it exists)

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

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6. Find the inverse of each of the matrices (if it exists)

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

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7. Find the inverse of each of the following matrices (if it exits) given in example number 5 to 11

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

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8. Find the inverse of each of the following matrices (if it exits) given in example number 5 to 11

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

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9. Find the inverse of each of the following matrices (if it exits) given in example number 5 to 11

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

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10. Find the inverse of each of the following matrices (if it exits) given in example number 5 to 11

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

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11. Find the inverse of each of the following matrices (if it exits) given in example number 5 to 11

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

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

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

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15. For the matrix $A = \begin{bmatrix} 1 & 1 & 1 \\ 1 & 2 & -3 \\ 2 & -1 & 3 \end{bmatrix}$ Show that $A^3 - 6A^2 + 5A + 11I = O$. Hence find A^{-1}

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16. If $A = \begin{bmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{bmatrix}$ Verify the result $A^3 - 6A^2 + 9A - 4I = O$ and hence find A^{-1}

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17. Let A be a nonsingular square matrix of order 3×3.Then |adj A| is equal to

A. |A|

B. $|A|^2$

C. $|A|^3$

D. 3|A|

Answer: B

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

A. det(A)

B. $\frac{1}{\det(A)}$

C. 1

D. 0

Answer: B

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Exercise 4 6

1. Examine the consistency of the system of linear equtions in 1 to 6

$x+2y=2$

$2x+3y=3$

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2. Examine the consistency of the system of linear equtions in 1 to 6

$2x-y=5$

$x+y=4$

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3. Examine the consistency of the system of linear equtions in 1 to 6

x+3y=5

2x+6y=8

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4. Examine the consistency of the system of linear equtions in 1 to 6

x+y+z=1

2x+3y+2z=2

ax+ay+2az=4

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5. Examine the consistency of the system of linear equtions in 1 to 6

3x-y-2z=2

2y-z=-1

3x-5y=3

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6. Examine the consistency of the system of linear equtions in 1 to 6

5x-y+4z=5

2x+3y+5z=2

5x-2y+6z=-1

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7. Solve system of linear equations, using matrix method in examples 7 to 14

5x+2y=4

7x+3y=5

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8. Solve system of linear equations, using matrix method in examples 7 to 14

2x-y=-2

3x+4y=3

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9. Solve system of linear equations, using matrix method in examples 7 to 14

4x-3y=3

3x-5y=7

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10. Solve system of linear equations, using matrix method in examples 7 to 14

5x+2y=3

3x+2y=5

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11. Solve system of linear equations, using matrix method in examples 7 to 14

2x+y+z=1

$x-2y-z=\frac{3}{2}$

3y-5z=9

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12. Solve system of linear equations, using matrix method in examples 7 to 14

x-y+z=4

2x+y-3z=0

x+y+z=2

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13. Solve system of linear equations, using matrix method in examples 7 to 14

2x+3y+3z=5

x-2y+z=-4

3x-y-2z=3

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14. Solve system of linear equations, using matrix method in examples 7 to 14

x-y+2z=7

3x+4y-5z=-5

2x-y+3z=12

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15. 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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16. The cost of 4 kg onion , 3 kg wheat and 2 kg rice is rupee रू 60. The cost of 2 kg onion , 4 kg wheat ad 6 kg rice is रू 90. The cost of 6 kg onion 2 kg wheatr and 3 kg rice is रू 70 . Find cost of each item per kg by matrix method

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Miscellaneous Exercise 4

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

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2. 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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3. 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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4. If a, b and c are real numbers , and $\Delta = \begin{vmatrix} b+c & c+a & a+b \\ c+a & a+b & b+c \\ a+b & b+c & c+a \end{vmatrix}$

Show that either a+b+c=0 or a=b=c

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5. 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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6. 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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7. If $A^{-1} = \begin{bmatrix} 3 & -1 & 1 \\ -15 & 6 & -5 \\ 5 & -2 & 2 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 2 & -2 \\ -1 & 3 & 0 \\ 0 & -2 & 1 \end{bmatrix}$ then find $(AB)^{-1}$

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8. Let $A = \begin{bmatrix} 1 & -2 & 1 \\ -2 & 3 & 1 \\ 1 & 1 & 5 \end{bmatrix}$ Verify that

$[adjA]^{-1} = adj(A^{-1})$

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9. Let $A = \begin{bmatrix} 1 & -2 & 1 \\ -2 & 3 & 1 \\ 1 & 1 & 5 \end{bmatrix}$ Verify that

$(A^{-1})^{-1} = A$

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

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11. Evaluate $\begin{vmatrix} 1 & x & y \\ 1 & x+y & y \\ 1 & x & x+y \end{vmatrix}$

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12. Using properties of determinants in Exercise 11 to 15 prove that

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

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13. Using properties of determinants in Exercise 11 to 15 prove that

$$\begin{vmatrix} x & x^2 & 1+px^3 \\ y & y^2 & 1+py^3 \\ z & z^2 & 1+pz^3 \end{vmatrix} = (1+pxyz)(x-y)(y-z)(z-x)$$

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14. Using properties of determinants in Exercise 11 to 15 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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15. Using properties of determinants in Exercise 11 to 15 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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16. Using properties of determinants in Exercise 11 to 15 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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17. Solve the following system of linear equations

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

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18. 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 .....

A. 0

B. 1

C. x

D. 2x

Answer: a

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19. If x,y,z are nonzero real numbers, then the inverse of matrix $A = \begin{bmatrix} x & 0 & 0 \\ 0 & y & 0 \\ 0 & 0 & z \end{bmatrix}$ is ....

A. $\begin{bmatrix} x^{-1} & 0 & 0 \\ 0 & y^{-1} & 0 \\ 0 & 0 & z^{-1} \end{bmatrix}$

B. $xyz\begin{bmatrix} x^{-1} & 0 & 0 \\ 0 & y^{-1} & 0 \\ 0 & 0 & z^{-1} \end{bmatrix}$

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

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

Answer: A

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20. Let $A = \begin{bmatrix} 1 & \sin\theta & 1 \\ -\sin\theta & 1 & \sin\theta \\ -1 & -\sin\theta & 1 \end{bmatrix}$

where $0 \leq \theta \leq \pi$ then

A. det(A)

B. $\det(A) \in (2, \infty)$

C. $\det(A) \in (2, 4)$

D. $\det(A) \in [2, 4]$

Answer: D

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Practice Work

1. Evaluate the following determinates

$$\begin{vmatrix} x & y \\ -y & x \end{vmatrix}$$

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2. Evaluate the following determinates

$\begin{vmatrix} 1 & \omega \\ \omega & -\omega \end{vmatrix}$ where ω is the cube root of unity

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3. Evaluate the following determinates

$$\begin{vmatrix} \sin 10^\circ, & -\cos 10^\circ \\ \sin 80^\circ, \cos 80^\circ \end{vmatrix}$$

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4. Evaluate the following determinates

$$\begin{vmatrix} 1+2\hat{i} & 1-\hat{i} \\ 1+\hat{i} & 1-2\hat{i} \end{vmatrix}$$

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5. Evaluate the following determinates

$$\begin{vmatrix} \log_a b & 1 \\ 1 & \log_b a \end{vmatrix}$$

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6. Evaluate the following determinates

$$\begin{vmatrix} -1 & 3 & 4 \\ 1 & 9 & 12 \\ 9 & 9 & 12 \end{vmatrix}$$

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7. Evaluate the following determinates

$$\begin{vmatrix} 0 & 1 & \sec\theta \\ \tan\theta & -\sec\theta & \tan\theta \end{vmatrix}$$

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8. If $\begin{vmatrix} x+1 & x-1 \\ x-3 & x+2 \end{vmatrix} = \begin{vmatrix} 4 & -1 \\ 1 & 3 \end{vmatrix}$ then find x

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9. If $\begin{vmatrix} 1 & 2 & x \\ 1 & 1 & 1 \\ 2 & 1 & -1 \end{vmatrix} = 0$ then find x.

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10. If $\begin{vmatrix} 4 & x \\ -3 & 5 \end{vmatrix} = 8$ then find x.

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11. If $\begin{vmatrix} m & -2 \\ 5 & 2m \end{vmatrix} = \begin{vmatrix} 5 & -4 \\ 5 & 3 \end{vmatrix}$ then find m

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12. If $\begin{vmatrix} x & 1 & 2 \\ 1 & 0 & 3 \\ 5 & -1 & 4 \end{vmatrix} = 0$ then find x

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13. Using the property of determinants and without expanding prove the following

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

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14. Using the property of determinants and without expanding prove the following

$$\begin{vmatrix} 1 & a & b+c \\ 1 & b & c+a \\ 1 & c & a+b \end{vmatrix} = 0$$

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15. Using the property of determinants and without expanding prove the following

$$\begin{vmatrix} 1 & \omega^n & \omega^{2n} \\ \omega^{2n} & 1 & \omega^n \\ \omega^n & \omega^{2n} & 1 \end{vmatrix} = 0$$ where ω is a cube root of unity

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16. Using the property of determinants and without expanding prove the following

$$\begin{vmatrix} 1 & 3 & 5 \\ 2 & 6 & 10 \\ 31 & 11 & 38 \end{vmatrix} = 0$$

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17. Using the property of determinants and without expanding prove the following

$$\begin{vmatrix} 42 & 1 & 6 \\ 28 & 7 & 4 \\ 14 & 3 & 2 \end{vmatrix} = 0$$

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18. Using the properties of determinants, solve the following for x

$$\begin{vmatrix} a+x & a-x & a-x \\ a-x & a+x & a-x \\ a-x & a-x & a+x \end{vmatrix} = 0$$

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

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20. Using the properties of determinants, prove the following

$$\begin{vmatrix} (b+c)^2 & a^2 & a^2 \\ b^2 & (c+a)^2 & b^2 \\ c^2 & c^2 & (a+b)^2 \end{vmatrix} = 2abc(a+b+c)^3$$

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21. Using the properties of determinants, prove the following

$$\begin{vmatrix} (x-2)^2 & (x-1)^2 & x^2 \\ (x-1)^2 & x^2 & (x+1)^2 \\ x^2 & (x+1)^2 & (x+2)^2 \end{vmatrix} = -8$$

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22. Using the properties of determinants, prove the following

It 2s=a+b+c then

$$\begin{vmatrix} a^2 & (s-a)^2 & (s-a)^2 \\ (s-b)^2 & b^2 & (s-b)^2 \\ (s-c)^2 & (s-c)^2 & c^2 \end{vmatrix} = 2s^3(s-a)(s-b)(s-c)$$

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23. Using the properties of determinants, prove the following

$$\begin{vmatrix} a^2 & b^2 & c^2 \\ (a+1)^2 & (b+1)^2 & (c+1)^2 \\ (a-1)^2 & (a-1)^2 & (c-1)^2 \end{vmatrix} = 4\begin{vmatrix} a^2 & b^2 & c^2 \\ a & b & c \\ 1 & 1 & 1 \end{vmatrix}$$

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24. If p^{th}, q^{th} and r^{th} tern of G.P are a,b and c respectively then

$$\begin{vmatrix} \log a & p & 1 \\ \log b & q & 1 \\ \log c & r & 1 \end{vmatrix} = 0$$

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

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

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26. Using the properties of determinants, prove the following

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

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27. Using the properties of determinants, prove the following

$$\begin{vmatrix} (a+b)^2 & ca & cb \\ ca & (b+c)^2 & ab \\ bc & ab & (c+a)^2 \end{vmatrix} = 2abc(a+b+c)^3$$

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28. Find area of the triangle withh vertices at the point given in each of the following :

(11,8),(3,2),(8,12)

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29. Find area of the triangle withh vertices at the point given in each of the following :

(5,4),(2,5),(2,3)

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30. Find area of the triangle withh vertices at the point given in each of the following :

(7,9),(10,8),(12,10)

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31. Find area of the triangle with vertices at the point given in each of the following

(2,7),(1,1),10,8)

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32. Find values of k if area of triangle is 4 sq. units and vertices are (2,2), (6,6) and (5,k).

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33. Find values of k if the points (3,5), (k,3) and (1,1) are collinear

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34. Find values of k if area of trianlge is 13 and vertices are (8,2), (k,4) and (6,4)

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35. Find the equation of line passing through the given points using determinants

(3,-2),(-1,4)

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36. Find the equation of line passing through the given points using determinants

(5,-1),(5,3)

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37. Find the equation of line passing through the given points using determinants

(1,-3),(5,-2)

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38. Find the equation of line passing through the given points using determinants

(7,8),(5,-2)

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39. Write minors and cofactors of the elements of following determinant

$$\begin{vmatrix} 5 & -10 \\ 0 & 3 \end{vmatrix}$$

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40. Write minors and cofactors of the elements of following determinant

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

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41. Write minors and cofactors of the elements of following determinant

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

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42. Verify: The value of the determinant remains unchanged if its rows and columns are interchanged.

$$\Delta = \begin{vmatrix} 2 & -3 & 5 \\ 6 & 0 & 4 \\ 1 & 5 & -7 \end{vmatrix}$$

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43. Write minors and cofactors of the elements of following determinant

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

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44. Uing cofactors of elements of first row evaluate $\begin{vmatrix} 2 & -1 & 3 \\ 6 & 4 & 16 \\ 8 & 5 & 8 \end{vmatrix}$

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45. Using cofactors of elements of second row evaluate $\begin{vmatrix} 1 & -3 & 2 \\ 4 & -1 & 2 \\ 3 & 5 & 2 \end{vmatrix}$

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46. Find adjoint of each of the matrices

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

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47. Find adjoint of each of the matrices

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

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48. Find adjoint of each of the matrices

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

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49. Find adjoint of each of the matrices

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

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50. Find adjoint of each of the matrices

$$\begin{bmatrix} 5 & 8 & 1 \\ 0 & 2 & 1 \\ 4 & 3 & -1 \end{bmatrix}$$

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51. Find the inverse of each of the following matrices

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

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52. Find the inverse of each of the following matrices

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

Watch Video Solution

53. Find the inverse of each of the following matrices

$$\begin{bmatrix} 5 & 8 & 1 \\ 0 & 2 & 1 \\ 4 & 3 & -1 \end{bmatrix}$$

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54. Find the inverse of each of the following matrices

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

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55. Find the inverse of each of the following matrices

$$\begin{bmatrix} 3 & -10 & -1 \\ -2 & 8 & 2 \\ 2 & -4 & -2 \end{bmatrix}$$

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56. Find the inverse of each of the following matrices

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

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57. For the matrix $A = \begin{bmatrix} 2 & 3 \\ 1 & 2 \end{bmatrix}$, show that $A^2 - 4A + I_2 = 0$. Hence, find A^{-1}

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58. If $A^{-1} = \begin{bmatrix} -4 & 2 \\ 3 & -1 \end{bmatrix}$ and $B = \begin{bmatrix} 0 & 3 \\ -2 & 5 \end{bmatrix}$ then find $(AB)^{-1}$

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59. For the matrix $A = \begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & 2 \\ 2 & 2 & 1 \end{bmatrix}$. Show that $A^2 - 4A - 5I = 0$ Hence find A^{-1}

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60. If $A = \begin{bmatrix} 3 & 1 \\ 7 & 5 \end{bmatrix}$ and $A^2 + xI = yA$ then find X and Y. Hence find A^{-1}

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61. If $A = \begin{bmatrix} -1 & 2 & 0 \\ -1 & 1 & 1 \\ 0 & 1 & 0 \end{bmatrix}$ then show that $A^{-1} = A^2$

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62. If $A = \begin{bmatrix} 1 & 2 & 1 \\ 2 & 1 & 3 \\ 1 & 1 & 0 \end{bmatrix}$ then prove that $A^3 - 2A^2 - 7A - 4I_3 = 0.$ Hence find A^{-1}

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63. If $A = \begin{bmatrix} 2 & 3 \\ 1 & -4 \end{bmatrix}, B = \begin{bmatrix} 1 & -20 \\ -1 & 3 \end{bmatrix}$ then verify $(AB)^{-1} = B^{-1}A^{-1}$

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64. $A = \begin{bmatrix} 2 & -3 \\ 4 & 6 \end{bmatrix}$ verify $(adjA)^{-1} = (adjA^{-1})$

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65. Solve system of linear equations , using matrix method if exists

3x+y=4

6x+2y=8

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66. Solve system of linear equations , using matrix method if exists

3x-y=5

6x-2y=3

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67. Solve system of linear equations , using matrix method if exists

5x-7=2

7x-5y=3

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68. Solve system of linear equations , using matrix method if exists

$5x+y-z=7$

$4x-2y-3z=5$

$7x+2y+2z=7$

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69. Solve system of linear equations , using matrix method if exists

$x-y+2z=1$

$2y-3z=1$

$3x-2y+4z=7$

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70. Solve system of linear equations , using matrix method if exists

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

x+2y+3z=6

2x-y+z=2

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71. Solve system of linear equations , using matrix method if exists

$$\frac{2}{x} - \frac{3}{y} + \frac{3}{z} = 10$$
$$\frac{1}{x} + \frac{1}{y} + \frac{1}{z} = 10$$
$$\frac{3}{x} - \frac{1}{y} + \frac{2}{z} = 13$$

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72. Solve system of linear equations , using matrix method if exists

$x - 2y = 10$

$2x + y + 3z = 8$

$-2y + z = 7$

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73. Solve system of linear equations , using matrix method if exists

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

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

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

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74. Solve system of linear equations , using matrix method if exists

$x-y+z=4$

$2x+y-3z=0$

$x+y+z=2$

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75. The sum of three numbrs is 6. If we multiply third number by 3 and add second number to itm we get 11 . By adding first and thrid numbers, we get double of the second number. Represent it algebraically and find the number using matrix method

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

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77. If $a \neq b \neq c$ and $\begin{vmatrix} a & a^3 & a^4-1 \\ b & b^3 & b^4-1 \\ c & c^3 & c^4-1 \end{vmatrix} = 0$ then prove that $abc(ab+bc+ca) = a+b+c$

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78. Prove that $\begin{vmatrix} \sqrt{13}+\sqrt{3} & 2\sqrt{5} & \sqrt{5} \\ \sqrt{15}+\sqrt{26} & 5 & \sqrt{10} \\ 3+\sqrt{65} & \sqrt{15} & 5 \end{vmatrix} = 5\sqrt{3}(\sqrt{6}-5)$

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79. Prove that

$$\begin{vmatrix} x^2 & y^2 & z^2 \\ (x+1)^2 & (y+1)^2 & (z+1)^2 \\ (x-1)^2 & (y-1)^2 & (z-1)^2 \end{vmatrix} = -4(x-y)(y-z)(z-x)$$

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80. Using the property of determinants andd without expanding in following exercises 1 to 7 prove that

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

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81. Solve that $\begin{vmatrix} 1+x & 1-x & 1-x \\ 1-x & 1+x & 1-x \\ 1-x & 1-x & 1+x \end{vmatrix} = 0$

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82. Show that $\begin{vmatrix} \sum_{r=1}^{16} 2^r & a & 2(2^{16}-1) \\ 3\sum_{r=1}^{16} 4^r & b & 4(4^{16}-1) \\ 7\sum_{r=1}^{16} 8^r & c & 8(8^{16}-1) \end{vmatrix} = 0$

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83. If $a_1, a_2, a_3 \dots a_r$ are in G.P then show that $\begin{vmatrix} a_{r+1} & a_{r+5} & a_{r+9} \\ a_{r+7} & a_{r+11} & a_{r+15} \\ a_{r+11} & a_{r+7} & a_{r+21} \end{vmatrix}$ is independent of r

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84. If $p \neq a, q \neq b, r \neq c$ and $\begin{vmatrix} p & b & c \\ a & q & c \\ a & b & r \end{vmatrix} = 0$ then prove that

$$\frac{p}{p-a} + \frac{q}{q-b} + \frac{r}{r-c} = 2$$

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85. $A = \begin{bmatrix} -5 & 1 & 3 \\ 7 & 1 & -5 \\ 1 & -1 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 1 & 2 \\ 3 & 2 & 1 \\ 2 & 1 & 3 \end{bmatrix}$ then find AB. Hence, solve the system of equation

$$\left.\begin{array}{l} x + y + 2z = 1 \\ 3x + 2y + z = 7 \\ 2x + y + 3z = 2 \end{array}\right\}$$

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86. If $a + b + c = 0$ and $\begin{vmatrix} a - x & c & b \\ c & b - x & a \\ b & a & c - x \end{vmatrix} = 0$ then find the value of x

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87. Solve $\begin{vmatrix} 4x & 6x + 2 & 8x + 1 \\ 6x + 2 & 9x + 3 & 12x \\ 8x + 1 & 12x & 16x + 2 \end{vmatrix} = 0$

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88. If A+B+C=π then find the value of

$$\begin{vmatrix} \sin^2 A & \sin A \cos A & \cos^2 A \\ \sin^2 B & \sin B \cos B & \cos^2 B \\ \sin^2 C & \sin C \cos C & \cos^2 C \end{vmatrix}$$

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89. Prove that

$$\begin{vmatrix} yz - x^2 & zx - y^2 & xz - z^2 \\ zx - y^2 & xy - z^2 & yz - x^2 \\ xy - z^2 & yz - x^2 & zx - y^2 \end{vmatrix} = \begin{vmatrix} r^2 & U^2 & U^2 \\ U^2 & r^2 & U^2 \\ U^2 & U^2 & r^2 \end{vmatrix}$$

where $r^2 + y^2 + z^2$ and $U^2 = xy + yz + zx$

(Hint : Use $|adjA| = |A|^2|$

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90. Suppose three digit numbers A28 , 3B9 and 52C , where A,B and C are integers between 0 and 9 are divisble by a fixed integer K, prove that the determinant $\begin{vmatrix} A & 3 & 6 \\ 8 & 9 & C \\ 2 & B & 2 \end{vmatrix}$ is also divisble by same integer K

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Textbook Based Mcqs

1. If $A = \begin{bmatrix} a & 0 & 0 \\ 0 & a & 0 \\ 0 & 0 & a \end{bmatrix}$ then |adjA| = ...

A. a^{27}

B. a^{9}

C. a^{6}

D. a^{2}

Answer: C

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2. If $A = \begin{bmatrix} 1 & 2 & -1 \\ -1 & 1 & 2 \\ 2 & -1 & 1 \end{bmatrix}$ then det(ad(adjA))=....

A. $(14)^{2}$

B. $(14)^3$

C. $(14)^4$

D. $(10)^1$

Answer: C

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3. If A is a orthogonal matrix, then

A. det(A)

B. $\det(A) = \pm 1$

C. det(A)=2

D. None of these

Answer: B

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4. $\Delta = \begin{vmatrix} a_1 & b_1 & c_1 \\ a_2 & b_2 & c_2 \\ a_3 & b_3 & c_3 \end{vmatrix}$ and $\Delta' \begin{vmatrix} A_1 & B_1 & C_1 \\ A_2 & B_2 & C_2 \\ A_3 & B_3 & C_3 \end{vmatrix}$

where $A_1, B_1, C_1, A_2, B_2, \ldots\ldots\ldots$ are respectively the cofactors of the elements $a_1, b_1, c_1, a_2, b_2, \ldots\ldots$ of the determinant then $\Delta' = \ldots\ldots.$

A. 0

B. 2Δ

C. Δ^3

D. Δ

Answer: C

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5. The elements of the determinant of order 3×3 are {0,1}. Then the maximum and minimum value are respectively ....

A. 1,-1

B. 2,-2

C. 4,-4

D. 6,-6

Answer: B

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6. $A = \begin{bmatrix} 0 & 1 & 2 \\ 1 & 2 & 3 \\ 3 & a & 1 \end{bmatrix}$ and $A^{-1} = \begin{bmatrix} \frac{1}{2} & -\frac{1}{2} & \frac{1}{2} \\ -4 & 3 & c \\ \frac{5}{2} & -\frac{3}{2} & \frac{1}{2} \end{bmatrix}$ then $a = \ldots\ldots$ and $c = \ldots\ldots\ldots$

A. 1,1

B. 1,-1

C. 1,2

D. $-1, 1$

Answer: B

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7.

$$\begin{vmatrix} x+1 & x^2+2 & x^2+x \\ x^2+1 & x+1 & x^2+2 \\ x^2+2 & x^2+x & x+1 \end{vmatrix} = ax^6+bx^5+cx^4+dx^3+ex^2+fx+g$$

then $f = ..., g = ...$

A. $f = -3, g = 7$

B. $f = 3, g = -5$

C. $f = -3, g = -9$

D. $f = -4, g = 9$

Answer: D

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8. $\Delta = \begin{vmatrix} p & 2-i & i+1 \\ 2+i & q & 3+i \\ 1-i & 3-i & r \end{vmatrix}$ is always ....

A. Real

B. Complex

C. Imaginary

D. None of these

Answer: A

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9. The system of equations $\begin{array}{l} x+2y+3z=4 \\ 2x+3y+4z=5 \\ 3x+4y+5z=6 \end{array}$ has .... solutions

A. Infinite

B. unique

C. None of these

D. can't say anything

Answer: A

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10. The equations $\begin{vmatrix} 7 & 6 & x \\ 2 & x & 2 \\ x & 3 & 7 \end{vmatrix} = 0$ has one root x = -9 then others roots ....

A. 2 and 6

B. 3 and 6

C. 2 and 7

D. 3 and 7

Answer: C

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11. If $f(x) = \begin{vmatrix} 1 & x & x+1 \\ 2x & x(x-1) & x(x+1) \\ 3x(x-1) & x(x-1)(x-2) & x\left(x^2-1\right) \end{vmatrix}$ then f(100)= ....

A. 0

B. 1

C. 100

D. -100

Answer: A

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12. $-1 \leq x < 0, 0 \leq y < 1, 1 \leq z < 2$ and $[\ \ ]$ is greatest interger function then,

$$\begin{vmatrix} [x]+1 & [y] & [z] \\ [x] & [y]+1 & [z] \\ [x] & [y] & [z]+1 \end{vmatrix} = \ldots\ldots$$

A. [x]

B. [y]

C. [z]

D. None of these

Answer: C

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13. If $\begin{vmatrix} 3 & 5 & 2 \\ 1 & 4 & 7 \\ 2 & 1 & 0 \end{vmatrix} = k\begin{vmatrix} 3 & 5 & 4 \\ 1 & 4 & 14 \\ 4 & 2 & 0 \end{vmatrix}$ then k=......

A. $\frac{1}{4}$

B. 4

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

D. 2

Answer: A

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14. $\begin{vmatrix} 1! & 2! & 3! \\ 2! & 3! & 4! \\ 3! & 4! & 5! \end{vmatrix} = \dots\dots\dots$

A. 5 !

B. 4 !

C. 3 !

D. 2 !

Answer: B

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15. The area of triangle with vertices (3,2),(8,12) and (11,8) is ....

A. 50

B. 25

C. 74

D. 37

Answer: B

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16. The sum of the cofator of the elements in second column in $\begin{vmatrix} 7 & 9 & 1 \\ 10 & 8 & 1 \\ 12 & 10 & 1 \end{vmatrix}$ is ....

A. 1

B. -4

C. 0

D. 5

Answer: C

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17. $\begin{vmatrix} \sin x & \cos x \\ \sin x & \sin x \end{vmatrix} = \begin{vmatrix} \cos x & \cos x \\ \cos x & \sin x \end{vmatrix}, x \in \left(0, \frac{\pi}{2}\right)$ then x=..........

A. $\frac{\pi}{3}$

B. $\frac{\pi}{4}$

C. $\frac{\pi}{6}$

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

Answer: B

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18. The equations of line passing through (-7,8) and (5,8) is ....

A. y=8

B. 5x-y-27=0

C. x-2y+9=0

D. 5x+y-27=0

Answer: A

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19. If $\begin{vmatrix} x & 4 & 10 \\ 5 & 2 & 5 \\ 7 & 3 & x \end{vmatrix} = 0$ then $x \in \ldots\ldots\ldots\ldots$

A. $\{10\}$

B. $\left\{\frac{15}{2}\right\}$

C. $\{10, 7\}$

D. $\left\{10, \frac{15}{2}\right\}$

Answer: A

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20. $D = \begin{vmatrix} a^2+2a & 2a+1 & 1 \\ 2a+1 & a+2 & 1 \\ 3 & 3 & 1 \end{vmatrix}$ then,

A. $D > 0 \quad \text{if} \quad a > 1$

B. $D < 0 \quad \text{if} \quad a < 1$

C. $D = 0 \quad \text{if} \quad a = 1$

D. All the given alternates

Answer: D

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21. The given system of equations x-ky-z=0, kx-y-z=0, x+y-z=0 has non zero solution then the possible value of k is .....

A. $-1 \quad \text{or} \quad 2$

B. 1 or 2

C. 0 or 1

D. $-1 \quad \text{or} \quad 1$

Answer: D

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22. If $\Delta_1 = \begin{vmatrix} x & b & b \\ a & x & b \\ a & a & x \end{vmatrix}$ and $\Delta_2 = \begin{vmatrix} x & b \\ a & x \end{vmatrix}$ are given determinants then,

A. $\Delta_1 = 3(\Delta_2)^2$

B. $\frac{d}{dx}(\Delta_1) = 3\Delta_2$

C. $\frac{d}{dx}(\Delta_1) = 3\Delta_2^2$

D. $\Delta_1 = 3(\Delta_2)^{\frac{3}{2}}$

Answer: B

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23. If A is a square matrix and |A| = 2 then $|A|^n$ = ... Where n is positive integer.

A. 0

B. 2n

C. 2^n

D. n^2

Answer: A

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24. If A is a square matrix and $A^2 = A then |A| = \ldots\ldots\ldots$

A. 0 or 1

B. $-2 \quad \text{or} \quad 2$

C. $-3 \quad \text{or} \quad 3$

D. None of these

Answer: A

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25. $\begin{vmatrix} a & -b & a-b \\ b & c & b-c \\ 2 & 1 & 0 \end{vmatrix} = 0$ then a,b,c are in ....

A. G.P

B. A.P

C. H.P

D. None of these

Answer: A

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26. $\begin{vmatrix} 2 & 3 & 4 \\ 4x & 6x & 8x \\ 5 & 7 & 8 \end{vmatrix} = \ldots\ldots$

A. 18x

B. 0

C. 1

D. $18x^3$

Answer: B

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27. The value of $\begin{vmatrix} 2008 & 2009 \\ 2010 & 2011 \end{vmatrix}$ is .....

A. -1

B. 1

C. -2

D. 2

Answer: C

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28. $\begin{vmatrix} x & 1 & y+z \\ y & 1 & z+x \\ z & 1 & x+y \end{vmatrix} = \ldots\ldots.$

A. x+y+z

B. (x+y)(y+z)(z+x)

C. 3

D. 0

Answer: D

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29. $\begin{vmatrix} \sin 40^\circ, & -\cos 40^\circ \\ \sin 50^\circ, & \cos 50^\circ \end{vmatrix} = \ldots\ldots.$

A. 0

B. 1

C. -1

D. not exist

Answer: B

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30. If $D = \begin{vmatrix} 2 & 3 & 1 \\ 5 & -1 & 2 \\ 7 & 4 & -1 \end{vmatrix}$, performing $R_{12(-1)}$ on D then D will become ....

A. $\begin{vmatrix} -1 & 3 & 1 \\ 6 & -1 & 2 \\ 3 & 4 & -1 \end{vmatrix}$

B. $\begin{vmatrix} 2 & 1 & 1 \\ 5 & -6 & 2 \\ 7 & -3 & -1 \end{vmatrix}$

C. $\begin{vmatrix} -3 & 4 & -1 \\ 5 & -1 & 2 \\ 7 & 4 & -1 \end{vmatrix}$

D. $\begin{vmatrix} 2 & 3 & 1 \\ 3 & -4 & 1 \\ 7 & 4 & -1 \end{vmatrix}$

Answer: D

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31. $\begin{vmatrix} 5^2 & 5^3 & 5^4 \\ 5^1 & 5^2 & 5^3 \\ 5^3 & 5^4 & 5^4 \end{vmatrix} = \ldots\ldots$

A. 5^9

B. 5^{12}

C. 5^{0}

D. 0

Answer: D

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32. If $D_1 = \begin{vmatrix} 1 & yz & x \\ 1 & zx & y \\ 1 & xy & z \end{vmatrix}$ and $D_2 = \begin{vmatrix} 1 & 1 & 1 \\ x & y & z \\ x^2 & y^2 & z^2 \end{vmatrix}$ then ,..........

A. $D_1 + 2D_2 = 0$

B. $2D_1 + D_2 = 0$

C. $D_1 + D_2 = 0$

D. $D_1 = D_2$

Answer: C

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33. If $a \neq 0, b \neq 0, c \neq 0$ and $\begin{vmatrix} 0 & x^2+a & x^4+b \\ x^2-a & 0 & x-c \\ x^3-b & x^2+c & 0 \end{vmatrix} = ?$, for x=0

A. 1

B. 0

C. a+b+c

D. $-(a+b+c)$

Answer: B

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34. If $x, y, z \in R. x > y > z$ and D=

$\begin{vmatrix} (x+1)^2 & (y+1)^2 & (z+1)^2 \\ x & y & z \\ 1 & 1 & 1 \end{vmatrix}$, then D is ....

A. negative

B. positive

C. zero

D. not real

Answer: B

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35. If $A = [(1, \cos\theta, 1,), (-\cos\theta, 1, \cos\theta), (-1, -\cos\theta, 1)]$ where $0 \leq \theta \leq 2\pi$ then .....

A. $(2, \infty)$

B. $(2, 4)$

C. [2,4]

D. [-2,2]

Answer: C

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36. If

$$\begin{vmatrix} a & b & ax+by \\ b & c & bx+cy \\ ax+by & bx+cy & 0 \end{vmatrix} = 0 \text{ and } ax^2 + 2abxy + cy^2 \neq 0, \quad \text{then} \quad ....$$

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

B. a,b,c are in G.P

C. a,b,c are A.P and G.P both

D. a,b,c are neither in A.P nor in G.P

Answer: B

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37. If $\begin{vmatrix} 1 & 2 & 5 \\ 1 & x & 5 \\ 3 & -1 & 2 \end{vmatrix} = 0$ then x = ...

A. 2

B. -2

C. 5

D. -5

Answer: A

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38. Solve that $\begin{vmatrix} 1+x & 1-x & 1-x \\ 1-x & 1+x & 1-x \\ 1-x & 1-x & 1+x \end{vmatrix} = 0$

A. o OR 1

B. o OR -1

C. 0 OR -3

D. 0 OR 3

Answer: D

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39. If $\begin{vmatrix} x & -6 & -1 \\ 2 & -3x & x-3 \\ -3 & 2x & x+2 \end{vmatrix} = 0$ then x = ...

A. $-3, \ -2, 1$

B. $-3, 2, \ -1$

C. $-3, 2, 1$

D. 3,2,1

Answer: C

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40. $\begin{vmatrix} \sqrt{14}+\sqrt{3} & \sqrt{20} & \sqrt{5} \\ \sqrt{15}+\sqrt{28} & \sqrt{25} & \sqrt{10} \\ 3+\sqrt{70} & \sqrt{15} & \sqrt{25} \end{vmatrix} = \ldots\ldots.$

A. $25\sqrt{3}-15\sqrt{2}$

B. $15\sqrt{2}+25\sqrt{3}$

C. $-25\sqrt{3}-15\sqrt{2}$

D. $15\sqrt{2} - 25\sqrt{3}$

Answer: D

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41. If `|{:(a,b,ax+b),(b,c,bx+c),(ax+b,bx+c,0):}|'=0 then "a,b,c are in" .. ("where ax^2+2bx-c ne' 0)

A. A.P

B. G.P

C. an increasing sequence

D. a decreasing sequence

Answer: B

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42. $\begin{vmatrix} \sin 35^\circ, & -\cos 35^\circ \\ \sin 55^\circ, \cos 55^\circ & \end{vmatrix} = \dots\dots\dots$

A. 1

B. 0

C. -1

D. 2

Answer: A

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Textbook Illustrations For Practice Work

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

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

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

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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 values of x for which $\begin{vmatrix} 3 & x \\ x & 1 \end{vmatrix} = \left| \ ()3, 2), (4, 1) :\} \right|$

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6. Verify: The value of the determinant remains unchanged if its rows and columns are interchanged.

$$\Delta = \begin{vmatrix} 2 & -3 & 5 \\ 6 & 0 & 4 \\ 1 & 5 & -7 \end{vmatrix}$$

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

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

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

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10. Using the property of determinants and without expanding prove the following

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

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11. 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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12. Without expanding prove that

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

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

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14. Prove that $\begin{bmatrix} b+c & a & a \\ b & c+a & b \\ c & c & b+a \end{bmatrix}$

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15. If x,y,z are different and

$\Delta = \begin{vmatrix} x & x^2 & 1+x^3 \\ y & y^2 & 1+y^3 \\ z & z^2 & 1+z^3 \end{vmatrix}$=0 then show that 1+xyz=0

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

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

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18. Find the equation of the line joining A(1,3) and B(0,0) using determinants and find k if D(k,0) is a point such that area of triangle ABD is 3sq. Units

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19. Find the minor of elements 6 in the determinant

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

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20. Find minors and cofactors of all the elements of the determinant

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

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21. 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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22. 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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23. Find adj A for A = $\begin{bmatrix} 2 & 3 \\ 1 & 4 \end{bmatrix}$

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24. If $A = \begin{bmatrix} 1 & 3 & 3 \\ 1 & 4 & 3 \\ 1 & 3 & 4 \end{bmatrix}$, then verify that A adjA=|A|I. Also find A^{-1}

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25. 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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26. 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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27. Solve the system of equations $\begin{matrix} 2x+5y=1 \\ 3x+2y=7 \end{matrix}$,

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28. Solve system of linear equations , using matrix method if exists

4x-3y+2z=4

3x-2y+3z=8

4x+2y-2z=2

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29. The sum of three numbrs is 6. If we multiply third number by 3 and add second number to itm we get 11 . By adding first and thrid numbers, we get double of the second number. Represent it algebraically and find the number using matrix method

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30. 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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31. If a,b,c are in A.P find value of

$$\begin{vmatrix} 2y+4 & 5y+7 & 8y+a \\ 3y+5 & 6y+8 & 9y+b \\ 4y+6 & 7y+9 & 10y+c \end{vmatrix}$$

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32. show that

$$\begin{bmatrix} (x+y)^2 & zx & zy \\ zx & (z+y)^2 & xy \\ zy & xy & (z+x)^2 \end{bmatrix} = 2xyz(x+y+z)^3$$

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33. Solve following system using matrix

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

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34. Prove that $\begin{vmatrix} a+bx & c+dx & p+qx \\ ax+b & cx+d & px+q \\ \mu & \vartheta & \omega \end{vmatrix} = (1-x^2)\begin{vmatrix} a & c & p \\ b & d & q \\ \mu & \vartheta & \omega \end{vmatrix}$

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Solutions Of Ncert Exemplar Problems Short Answer Type Questions

1. Evaluate the determinants below in examples number 1 and 2

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

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2. Using the properties of determinants in Exercise 1 to 6, evaluate

$$\begin{vmatrix} a+x & y & z \\ x & a+y & z \\ x & y & a+z \end{vmatrix}$$

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3. Using the properties of determinants in Exercise 1 to 6, evaluate

$$\begin{vmatrix} 0 & xy^2 & xz^2 \\ x^2y & 0 & yz^2 \\ x^2z & y^2z & 0 \end{vmatrix}$$

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4. Using the properties of determinants in Exercise 1 to 6, evaluate

$$\begin{vmatrix} 3x & -x+y & -x+z \\ x-y & 3y & z-y \\ x-z & y-z & 3z \end{vmatrix}$$

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5. Using the properties of determinants in Exercise 1 to 6, evaluate

$$\begin{vmatrix} x+4 & x & x \\ x & x+4 & x \\ x & x & x+4 \end{vmatrix}$$

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6. Using the properties of determinants in Exercise 1 to 6, evaluate

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

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7. Using the proprties of determinants in Exercise 7 to 9, prove that

$$\begin{vmatrix} y^2z^2 & yz & y+z \\ x^2z^2 & zx & z+x \\ x^2y^2 & xy & x+y \end{vmatrix} = 0$$

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8. Using the proprties of determinants in Exercise 7 to 9, prove that

$$|(y+z, z+y), (z, z+x, x), (y, x, x+y)| = 4xyz$$

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9. Using the proprties of determinants in Exercise 7 to 9, prove that

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

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10. If A+B+C = 0 then prove that

$$\begin{vmatrix} 1 & \cos C & \cos B \\ \cos C & 1 & \cos A \\ \cos B & \cos A & 1 \end{vmatrix} = 0$$

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11. If the co-ordinates of the vertices of an equilateral trianlg with sides of length 'a' are $(x_1, y_1), (x_2, y_2), (x_3, y_3)$, then Prove that

$$\begin{vmatrix} x_1 & y_1 & 1 \\ x_2 & y_2 & 1 \\ x_3 & y_3 & 1 \end{vmatrix}^2 = \left(\frac{3}{4}\right)a^4.$$

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12. Find the value of θ satisfying

$$\begin{vmatrix} 1 & 1 & \sin 3\theta \\ -4 & 3 & \cos 2\theta \\ 7 & -7 & -2 \end{vmatrix} = 0$$

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13. If $\begin{vmatrix} 4-x & 4+x & 4+x \\ 4+x & 4-x & 4+x \\ 4+x & 4+x & 4-x \end{vmatrix} = 0$ then find values of x

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14. If $a_1, a_2, a_3 \ldots a_r$ are in G.P then show that $\begin{vmatrix} a_{r+1} & a_{r+5} & a_{r+9} \\ a_{r+7} & a_{r+11} & a_{r+15} \\ a_{r+11} & a_{r+7} & a_{r+21} \end{vmatrix}$ is independent of r

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15. Show that the points (a+5,a-4),(a-2,a+3) and (a,a) do not lie on a straight line for any value of a

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16. Show that the ΔABC is an isosceles triangle if the determinant

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

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17. Find A^{-1} if $A=\begin{bmatrix}0&1&1\\1&0&1\\1&1&0\end{bmatrix}$ and show that $A^{-1}=\frac{A^2-3I}{2}$

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Solutions Of Ncert Exemplar Problems Long Answer Type Questions

1. If $A=\begin{bmatrix}1&2&0\\-2&-1&-2\\0&-1&1\end{bmatrix}$ find A^{-1}. Using A^{-1}, solve the system of linear equations x-2y=10, 2x-y-z=8, -2y+z=7`.

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2. Solve system of linear equations , using matrix method if exists

3x+2y-2z=3

x+2y+3z=6

2x-y+z=2

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3. Given $A = \begin{bmatrix} 2 & 2 & -4 \\ -4 & 2 & -4 \\ 2 & -1 & 5 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & -1 & 0 \\ 2 & 3 & 4 \\ 0 & 1 & 2 \end{bmatrix}$. Find A.B and use this to solve the system of equations y+2z=7,x-y=3,2x+3y+4z=17

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4. If $a+b+c \neq 0$ and $\begin{vmatrix} a & b & c \\ b & c & a \\ c & a & b \end{vmatrix} = 0$ then prove that a=b=c

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5. The determinant $\begin{vmatrix} b^2-ab & b-c & bc-ac \\ ab-a^2 & a-b & b^2-ab \\ bc-ac & c-a & ab-a^2 \end{vmatrix}$ equals ....

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6. If x+y+z = 0 prove that

$$\begin{vmatrix} xa & yb & zc \\ yc & za & xb \\ zb & xc & ya \end{vmatrix} = xyz\begin{vmatrix} a & b & c \\ c & a & b \\ b & c & a \end{vmatrix}$$

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Solutions Of Ncert Exemplar Problems Objective Type Questions

1. If $\begin{vmatrix} 2x & 5 \\ 8 & x \end{vmatrix} = \begin{vmatrix} 6 & -2 \\ 7 & 3 \end{vmatrix}$, then value of x is ....

A. 3

B. ± 3

C. ± 6

D. 6

Answer: C

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2. The value of determinant $\begin{vmatrix} a-b & b+c & a \\ b-a & c+a & b \\ c-a & a+b & c \end{vmatrix}$

A. $a^3+b^3+c^3$

B. 3 abc

C. $a^3+b^3+c^3-3abc$

D. None of these

Answer: D

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3. The area of a triangle with vertices A(-3,0), B(3,0) and (0,k) is 9 sq. units .

The value of k will be.........

A. 9

B. 3

C. -9

D. 6

Answer: B

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

A. abc(a-b) (b-c) (c-a)

B. (a-b) (b-c) (c-a)

C. (a+b+c) (a-b) (b-c) (c-a)

D. None of these

Answer: D

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5. The number of distinct real roots of $\begin{vmatrix} \sin x & \cos x & \cos x \\ \cos x & \sin x & \cos x \\ \cos x & \cos x & \sin x \end{vmatrix} = 0$ in the interval $-\frac{\pi}{4} \leq x \leq \frac{\pi}{4}$ is ....

A. 0

B. 2

C. 1

D. 3

Answer: C

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6. 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

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7. Let $f(t) = \begin{vmatrix} \cos t & t & 1 \\ 2\sin t & t & 2t \\ \sin t & t & t \end{vmatrix}$ then $\lim_{t \to 0} \frac{f(t)}{t^2}$ equal to ....

A. 0

B. -1

C. 2

D. 3

Answer: A

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8. The maximum value of $\Delta = \begin{vmatrix} 1 & 1 & 1 \\ 1 & 1 - \sin\theta & 1 \\ 1 + \cos\theta & 1 & 1 \end{vmatrix}$ is (θ is real number) ....

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

B. $\frac{\sqrt{3}}{2}$

C. $\sqrt{2}$

D. $\frac{2\sqrt{3}}{4}$

Answer: A

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9. If $f(x) = \begin{vmatrix} 0 & x - a & x - b \\ x + a & 0 & x - c \\ x + b & x + c & 0 \end{vmatrix}$, then ....

A. f(a)=0

B. f(b)=0

C. f(0)=0

D. f(1)=0

Answer: C

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10. If $A = \begin{bmatrix} 2 & \lambda & -3 \\ 0 & 2 & 5 \\ 1 & 1 & 3 \end{bmatrix}$, then A^{-1} exists if ....

A. $\lambda = 2$

B. $\lambda \neq 2$

C. $\lambda \neq -2$

D. None of these

Answer: D

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11. If A and B are invertible matrices, then which of the following is not correct

A. $adjA = |A|. A^{-1}$

B. $\det(A)^{-1} = (\det A)^{-1}$

C. $(A. B)^{-1} = B^{-1}. A^{-1}$

D. $(A + B)^{-1} = B^{-1} + A^{-1}$

Answer: D

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12. If x,y,z are all different from zero and $\begin{vmatrix} 1+x & 1 & 1 \\ 1 & 1+y & 1 \\ 1 & 1 & 1+z \end{vmatrix} = 0$ then value of $x^{-1} + y^{-1} + z^{-1}$ is ....

A. xyz

B. $x^{-1}. y^{-1}. z^{-1}$

C. $-(xyz)$

D. -1

Answer: D

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13. The value of the determinant

$$\begin{vmatrix} x & x+y & x+2y \\ x+2y & x & x+y \\ x+y & x+2y & x \end{vmatrix} \text{ is } \ldots\ldots\ldots$$

A. $9x^2(x+y)$

B. $9y^2(x+2y)$

C. $3y^2(x+y)$

D. $7x^2(x+y)$

Answer: B

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14. There are two values of a which makes determinant

$\Delta = \begin{vmatrix} 1 & -2 & 5 \\ 2 & a & -1 \\ 0 & 4 & 2a \end{vmatrix} = 86$, then sum of these number is ....

A. 4

B. 5

C. -4

D. 9

Answer: C

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Solutions Of Ncert Exemplar Problems Fillers

1. If A is a matrix of order 3×3, then |3A|= ....

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2. If A is invertible matrix of order 3×3 then $|A^{-1}| = \ldots\ldots\ldots$

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3. If $x, y, z \in R$, then the value of determinant $\begin{vmatrix} (2^x + 2^{-x})^2 & (2^x - 2^{-x})^2 & 1 \\ (3^x + 3^{-x})^2 & (3^x - 3^{-x})^2 & 1 \\ (4^x + 4^{-x})^2 & (4^x - 4^{-x})^2 & 1 \end{vmatrix}$ is equal to ....

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4. If $\cos(2\theta) = 0$ then $\begin{vmatrix} 0 & \cos\theta & \sin\theta \\ \cos\theta & \sin\theta & 0 \\ \sin\theta & 0 & \cos\theta \end{vmatrix}^2 = \ldots\ldots\ldots\ldots$

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5. If A is a matrix of order 3×3, then $(A^2)^{-1}$="........."`

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6. If A is a matrix of order 3×3, then number of minors in determinant of A are ....

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7. The sum of the products of elements of any row with the co-factors of corresponding elements is equal to ....

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8. If x = -9 is a root of $\begin{vmatrix} x & 3 & 7 \\ 2 & x & 2 \\ 7 & 6 & x \end{vmatrix} = 0$, then other two roots are ....

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9. $\begin{vmatrix} 0 & xyz & x-z \\ y-x & 0 & y-z \\ z-x & z-y & 0 \end{vmatrix} = \dots\dots\dots$

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10. If $\begin{vmatrix} (1+x)^{17} & (1+x)^{19} & (1+x)^{23} \\ (1+x)^{23} & (1+x)^{29} & (1+x)^{34} \\ (1+x)^{41} & (1+x)^{43} & (1+x)^{47} \end{vmatrix} = Ax^2 + Bx + C$ then value of A = ...

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Solutions Of Ncert Exemplar Problems True False

1. $(A^3)^{-1} = (A^{-1})^3$, where A is a square matrix and $|A| \neq 0$

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2. $(a.\ A)^{-1} = \frac{1}{a}.\ A^{-1}$ where a is any real number and A is square matrix

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3. $|A^{-1}| \neq |A|^{-1}$, where is non-singular matrix

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4. If A and B are matrices of order 3 and |A| = 5 , |B| = 3, then |3AB| = $27 \times 5 \times 3 = 405.$

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5. If the value of a third order determinant is 12, then the value of ther determinant formed by replacing each element by its co-factor will be 144

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6. $\begin{vmatrix} x+1 & x+2 & x+a \\ x+2 & x+3 & x+b \\ x+3 & x+4 & x+c \end{vmatrix} = 0$ where a,b,c are in A.P

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7. $|adjA| = |A|^2$, where A is a square matrix of order two

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8. The determinant $\begin{vmatrix} \sin A & \cos A & \sin A + \cos B \\ \sin B & \cos A & \sin + \cos B \\ \sin C & \cos A & \sin C + \cos B \end{vmatrix}$ is equal to zero

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9. If the determinant $\begin{vmatrix} x+a & p+u & l+f \\ y+b & q+v & m+g \\ z+c & r+w & n+h \end{vmatrix}$ splits into exactly K determinants of order 3, each elements of which contains only one term, then the value of K is 8

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10. Let $\Delta = \begin{vmatrix} a & p & x \\ b & q & y \\ c & r & z \end{vmatrix} = 16 \text{ then } \Delta_1 = \begin{vmatrix} p+x & a+x & a+p \\ q+y & b+y & b+q \\ r+z & c+z & c+r \end{vmatrix} = 32$

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11. The maximum value of $\begin{vmatrix} 1 & 1 & 1 \\ 1 & 1+\sin\theta & 1 \\ 1 & 1 & 1+\cos\theta \end{vmatrix}$ is $\frac{1}{2}$

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Practice Paper 4 Section A

1. Answer the question no 1 to 5 from he options : (Each of 1 mark)

$\begin{vmatrix} \sin 40^\circ, & -\cos 40^\circ \\ \sin 50^\circ, \cos 50^\circ & \end{vmatrix} = \ldots\ldots\ldots$

A. 0

B. 1

C. -1

D. not exist

Answer:

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2. Answer the question no 1 to 5 from he options : (Each of 1 mark)

If $\begin{vmatrix} x & 2 \\ 18 & x \end{vmatrix} = \begin{vmatrix} 6 & 2 \\ 18 & 6 \end{vmatrix}$, then ,x = ...

A. 6

B. ± 6

C. -6

D. 6,6

Answer:

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3. Answer the question no 1 to 5 from he options : (Each of 1 mark)

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

A. 1

B. -1

C. 0

D. 6

Answer:

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4. Answer the question no 1 to 5 from he options : (Each of 1 mark)

Co-factor of -1 determinant $\begin{vmatrix} 1 & 0 & 4 \\ 3 & 5 & -1 \\ 0 & 1 & 2 \end{vmatrix}$ is ......

A. 1

B. -1

C. 0

D. ± 1

Answer:

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5. If area of triangle whose vertices are (2,2) (6,6) and (5,k) is 4 then k= ....

A. $-3, \ -7$

B. 3,7

C. $-3, 7$

D. $3, \ -7$

Answer:

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Practice Paper 4 Section B

1. Using the property of determinants andd without expanding in following exercises 1 to 7 prove that

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

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2. If area of triangle is 35 sq. units with vertices $(2, -6), (5, 4)$ and $(k, 4)$, then $k = \ldots\ldots\ldots$

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3. $A = \begin{bmatrix} 1 & -1 & 2 \\ 2 & 3 & 5 \\ -2 & 0 & 1 \end{bmatrix}$ then find (adj A)

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4. 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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Practice Paper 4 Section C

1. Solve the system of linear equations, using matrix method

$$\left.\begin{array}{l} x + y + z = 6 \\ y + 3z = 1 \\ x + z = 2y \end{array}\right\}.$$

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2. Using the property of determinants andd without expanding in following exercises 1 to 7 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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3. Prove that $\begin{vmatrix} a+bx & c+dx & p+qx \\ ax+b & cx+d & px+q \\ \mu & \vartheta & \omega \end{vmatrix} = (1-x^2)\begin{vmatrix} a & c & p \\ b & d & q \\ \mu & \vartheta & \omega \end{vmatrix}$

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

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Practice Paper 4 Section D

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

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2. If $f(n) = \alpha^n + \beta^n$ then show that

$$\begin{vmatrix} 3 & 1+f(1) & 1+f(2) \\ 1+f(1) & 1+f(2) & 1+f(3) \\ 1+f(2) & 1+f(3) & 1+f(4) \end{vmatrix} = (1-\alpha)^2(1-\beta)^2(\alpha-\beta)^2$$

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