MATHS

NCERT - FULL MARKS MATHS(TAMIL)

DETERMINANTS

Example

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

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

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

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

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5. Find values of x for which $\begin{bmatrix} 3 & x \\ x & 1 \end{bmatrix} = \begin{bmatrix} 3 & 2 \\ 4 & 1 \end{bmatrix}$

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

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

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

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

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10. Prove that $\sum_{r=0}^{n} 3^{rn} C_r = 4^n$

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

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12. Without expanding prove that $\Delta = \begin{bmatrix} x+y & y+z & z+x \\ z & x & y \\ 1 & 1 & 1 \end{bmatrix} = 0$

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

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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. $\begin{bmatrix} x & x^2 & 1+px^3 \\ y & y^2 & 1+py^3 \\ z & z^2 & 1+pz^3 \end{bmatrix} = (1+pxyz)(x-y)(y-z)(z-x)$, where p is any scalar .

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16. Show that

$$\begin{bmatrix} 1+a & 1 & 1 \\ 1 & 1+b & 1 \\ 1 & 1 & 1+c \end{bmatrix} = abc\left(1+\frac{1}{a}+\frac{1}{b}+\frac{1}{c}\right) = abc+bc+ca+ab$$

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

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20. Find the minor and cofactors of all the elements of the determinants $\begin{bmatrix} 1 & -2 \\ 4 & 3 \end{bmatrix}$

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

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22. Find minors and cofactors of the elements of the determinant $\begin{bmatrix} 2 & -3 & 5 \\ 6 & 0 & 4 \\ 1 & 5 & -7 \end{bmatrix}$ 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 adj A = |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. 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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27. Solve the system of equation

$2x + 5y = 1$

$3x + 2y = 7$

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28. Solve the following system of equations by matrix method.

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

$2x + y - z = 1$

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

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29. The sum of three numbers is 6. If we multiply third numbers by 3. and add second numbers 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.

A. $x = 1, y = 2, z = 3$

B.

C.

D.

Answer:

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30. If, a,b,c are positive and unequal,show that value of the determinant

$$\Delta = \begin{bmatrix} a & b & c \\ b & c & a \\ c & a & b \end{bmatrix}$$ is negative

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

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

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32. Use product $\begin{bmatrix} 1 & -1 & 2 \\ 0 & 2 & -3 \\ 3 & -2 & 4 \end{bmatrix}\begin{bmatrix} -2 & 0 & 1 \\ 9 & 2 & -3 \\ 6 & 1 & -2 \end{bmatrix}$ to solve the system of equations

$x - y + 2z = 1$

$2y - 3z = 1$

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

A. `

B.

C.

D.

Answer:

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33. Prove that

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

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Exercise 4 1

1. Evaluate the determinants.

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

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2. Evaluate the determinants

$(i)\begin{bmatrix} \cos\theta & -\sin\theta \\ \sin\theta & \cos\theta \end{bmatrix}$ $(ii)\begin{bmatrix} x^2-x+1 & x-1 \\ x+1 & x+1 \end{bmatrix}$

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

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4. 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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5. Compute the indicated products:

(i) $\begin{bmatrix} a & b \\ -b & a \end{bmatrix}\begin{bmatrix} a & -b \\ b & a \end{bmatrix}$

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

(iii) $\begin{bmatrix} 1 & -2 \\ 2 & 3 \end{bmatrix}\begin{bmatrix} 1 & 2 & 3 \\ 2 & 3 & 1 \end{bmatrix}$

(iv) $\begin{bmatrix} 2 & 3 & 4 \\ 3 & 4 & 5 \\ 4 & 5 & 6 \end{bmatrix}\begin{bmatrix} 1 & -3 & 5 \\ 0 & 2 & 4 \\ 3 & 0 & 5 \end{bmatrix}$

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

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

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6. If $A = \begin{bmatrix} 1 & 1 & -2 \\ 2 & 1 & -3 \\ 5 & 4 & -9 \end{bmatrix}, f \in d|A|$

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7. Find values of x, if

$(i)\begin{bmatrix}2 & 4\\ 5 & 1\end{bmatrix}=\begin{bmatrix}2x & 4\\ 6 & x\end{bmatrix}$ $(ii)\begin{bmatrix}2 & 3\\ 4 & 5\end{bmatrix}=\begin{bmatrix}x & 3\\ 2x & 5\end{bmatrix}$

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8. If $\begin{bmatrix}x & 2\\ 18 & x\end{bmatrix}=\begin{bmatrix}6 & 2\\ 18 & 6\end{bmatrix}$, then x is equal to

A. 6

B. ±6

C. -6

D. 0

Answer: B

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Exercise 4 2

1. Using the property of determinants and without expanding

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

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2. Using the property of determinants and without expanding

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

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3. Using the property of determinants and without expanding

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

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4. Using the property of determinants and without expanding

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

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5. Using the property of determinants and without expanding

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

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6. Using the property of determinants and without expanding

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

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7. Using the property of determinants and without expanding

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

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8. By using properties of determinants , show that : (i)

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

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

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9. By using properties of determinants , show that :

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

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10. $y = e^{2x}(a + bx)$

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11. Using the property of determinants and without expanding

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

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12. By using properties of determinants , show that :

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

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13. By using properties of determinants, show that :

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

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14. By using properties of determinants, show that :

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

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15. 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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16. 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

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 the area of the triangle vertices are

(2, 3) (-1, 0), (2, -4)

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4. Show that points

$A(a, b+c), B(b, c+a), C(c, a+b)$ are collinear.

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5. Find values of k if area of triangle is 4 sq. units and vertices are

$(i)(k, 0), (4, 0), (0, 2)(ii)(-2, 0), (0, 4), (0, k)$

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

(ii) Find equation of line joining (3,1) and (9,3) using determinants.

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7. If area of triangle is 35sq 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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Exercise 4 4

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

(i) $\begin{bmatrix} 2 & -4 \\ 0 & 3 \end{bmatrix}$ (ii) $\begin{bmatrix} a & c \\ b & d \end{bmatrix}$

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2. (i) $\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$ $(ii)\begin{bmatrix} 1 & 0 & 4 \\ 3 & 5 & -1 \\ 0 & 1 & 2 \end{bmatrix}$

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

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4. Using Cofactors of elements of third column , evaluate , $\Delta = \begin{bmatrix} 1 & x & yz \\ 1 & y & zx \\ 1 & z & xy \end{bmatrix}$

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5. If $\Delta = \begin{bmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{bmatrix}$ and is Cofactors of $a_i j$ 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. $a_{21}A_{11} + a_{22}A_{12} + a_{23}A_{13}$

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

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

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2. Find adjoint of each of the matrices

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

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3. Verify A (adj A) = (adj A) A= |A| I in $\begin{bmatrix} 2 & 3 \\ -4 & -6 \end{bmatrix}$

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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11. 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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12. 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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13. 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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14. $A = \begin{bmatrix} 1 & 1 & 1 \\ 1 & 2 & -3 \\ 2 & -1 & 3 \end{bmatrix}$

Show that $A^3 - 6A^2 + 5A + 11I = O$. Hence , find A^{-1}

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15. If $A = \begin{bmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{bmatrix}$

Verify that $A^3 - 6A^2 + 9A - 4I = O$ and hence find A^{-1}

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16. 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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17. 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 equations

$x+2y=2$

$2x+3y=3$

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2. Examine the consistency of the system of equations

$2x - y = 5$

$x + y = 4$

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3. Examine the consistency of the system of equations

$x + 3y = 5$

$2x + 6y = 8$

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4. Examine the consistency of the system of equations

$x + y + z = 1$

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

$ax + ay + 2az = 4$

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5. Examine the consistency of the system of equations

$3x - y - 2z = 2$

$2y - z = -1$

$3x - 5y = 3$

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6. Examine the consistency of the system of equations

$5x - y + 4z = 5$

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

$5x - 2y + 6z = -1$

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7. Solve system of linear equations , using matrix method

$5x + 2y = 4$

$7x + 3y = 5$

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8. Solve system of linear equations , using matrix method

$2x - y = -2$

$3x + 4y = 3$

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9. Solve system of linear equations , using matrix method

$4x - 3y = 3$

$3x - 5y = 7$

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10. Solve system of linear equations , using matrix method

$5x + 2y = 3$

$3x + 2y = 5$

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11. Solve system of linear equations , using matrix method

$2x + y + z = 1$

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

$3y - 5z = 9$

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12. Solve system of linear equations , using matrix method

$x - y + z = 4$

$2x + y - 3z = 0$

$x + y + z = 2$

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13. Solve system of linear equations , using matrix method

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

$x - 2y + z = -4$

$3x - y - 2z = 3$

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14. Solve system of linear equations , using matrix method

$x - y + 2z = 7$

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

$2x - y + 3z = 12$

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15. If $\begin{bmatrix} 2 & -3 & 5 \\ 3 & 2 & -4 \\ 1 & 1 & -2 \end{bmatrix}$, 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 ,3kg wheat and 2kg rice is rupes 60. The cost of 2 kg onion , 4kg wheat and 6kg rice is rupes 90. The cost of 6kg onion 2kg wheat and 3 kg rice is rupes 70. Find cost of each item per kg by matrix method.

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Miscellaneous Exercises On Chapter 4

1. Prove that the determinant $\begin{bmatrix} x & \sin\theta & \cos\theta \\ -\sin\theta & -x & 1 \\ \cos\theta & 1 & x \end{bmatrix}$ is independent of \`theta.

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2. Without expanding the determinant, prove that

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

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3. Evaluate $\begin{bmatrix} \cos\alpha\cos\beta & \cos\alpha\sin\beta & -\sin\alpha \\ -\sin\beta & \cos\beta & 0 \\ \sin\alpha\cos\beta & \sin\alpha\sin\beta & \cos\alpha \end{bmatrix} = 0$

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4. If a,b and c are real numbers, and

$$\Delta = \begin{bmatrix} b+c & C+a & a+b \\ c+a & a+b & b+c \\ a+b & b+c & c+a \end{bmatrix} = 0$$

Show that either $a+b+c=0 \text{or} a=b=c.$

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

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

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

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9. Evaluate $\begin{bmatrix} x & y & x+y \\ y & x+y & x \\ x+y & x & y \end{bmatrix}$

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10. Evaluate $\begin{bmatrix} 1 & x & y \\ 1 & x+y & y \\ 1 & x & x+y \end{bmatrix}$

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11. Using properties of determinants in Exercises prove that :

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

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12. $\begin{bmatrix} x & x^2 & 1+px^3 \\ y & y^2 & 1+py^3 \\ z & z^2 & 1+pz^3 \end{bmatrix} = (1+pxyz)(x-y)(y-z)(z-x),$ where p is any scalar .

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13. solve $\begin{bmatrix} 3a & -a+b & -a+c \\ -b+a & 3b & -b+c \\ -c+a & -c+b & 3c \end{bmatrix} = 3(a+b+c)(ab+bc+ca)$

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

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15. Without expanding evaluate the determinant

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

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16. Solve system of linear equations , using matrix method

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

$x - 2y + z = -4$

$3x - y - 2z = 3$

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

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

A. 0

B. 1

C. x

D. $2x$

Answer: A

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18. If x,y,z are nonzero real number , 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. $\frac{1}{xyz}\begin{bmatrix} x & 0 & 0 \\ 0 & y & 0 \\ 0 & 0 & z \end{bmatrix}$

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

Answer: A

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

A. $Det(A) = 0$

B. $Det(A) \in (-2, \infty)$

C. $Det(A) \in (2, 0)$

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

Answer: D

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