MATHS

BOOKS - OSWAAL PUBLICATION MATHS (KANNADA ENGLISH)

DETERMINANTS

Topic 1 Determinants Minors Cofactors Very Short Answer Questions

1. find the inverse matrix of A, $A=\begin{bmatrix}4 & 7\\ 3 & 5\end{bmatrix}$ by using elementary column transformation .

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

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3. IF $\begin{vmatrix} x & 2 \\ 3 & x \end{vmatrix} = \begin{vmatrix} x & 2 \\ -3 & -x \end{vmatrix}$ find the value of x.

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4. Find |3A| if $A = \begin{bmatrix} 4 & -1 \\ 3 & 2 \end{bmatrix}$.

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5. If $\begin{vmatrix} x & 8 \\ 8 & x \end{vmatrix} = \begin{vmatrix} 2 & 8 \\ 8 & 2 \end{vmatrix}$ find the value of x.

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6. Find the value of x for which $\begin{vmatrix} 3 & x \\ x & 1 \end{vmatrix} = \begin{vmatrix} 3 & 2 \\ 4 & 1 \end{vmatrix}$

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7. If $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$, then: $adj(adjA) =$

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8. IF $A = \begin{bmatrix} 1 & 2 \\ 4 & 2 \end{bmatrix}$, find |2A|.

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9. If A is a square matrix with |A| = 6, find the value of $|AA'|$.

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10. If A is a matrix of order 3×3, then $|3A|$ is equal to.........

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11. Write the value of the determinant $|pp + 1p - 1p|$.

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12. Write the value of $|276538755986|$

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

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14. IF $\begin{vmatrix} 3x & 7 \\ -2 & 4 \end{vmatrix} = \begin{vmatrix} 8 & 7 \\ 6 & 4 \end{vmatrix}$ find the value of x.

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15. IF A is a 3×3 matrix, $|A| \neq 0$ and $|3A| = k|A|$, then write the values of k.

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16. IF $A = \begin{vmatrix} 4 & 6 \\ 7 & 5 \end{vmatrix}$ then What is the value of A.

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17. IF $\begin{vmatrix} \sin\alpha & \cos\beta \\ \cos\alpha & \sin\beta \end{vmatrix} = \frac{1}{2}$, where α and β are acute angles then write the value of $\alpha + \beta$.

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18. If A is square matrix of order 3 such that $|adj\ A| = 64$, find $|A|$.

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19. IF $\begin{vmatrix} 2x & x+3 \\ 2(x+1) & x+1 \end{vmatrix} = \begin{vmatrix} 1 & 5 \\ 3 & 3 \end{vmatrix}$ write the value of x.

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20. In the matrix $A = \begin{bmatrix} 3-2x & x+1 \\ 2 & 4 \end{bmatrix}$ is singular then X=?

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21. If A is an invertible matrix of order 3 and $|A| = 5$, then find $|adj\ A|$.

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22. If $|x+1x-1x-3x+2| = |4-113|$, then write the value of x.

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23. If A_{ij} is the cofactor of the element a_{ij} of the determinant $[2-3-7604157]$, then write the value of $a_{32}\cdot A_{32}\cdot$

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24. If A is a square matrix and $|A|$ =2, then write the value of $|\forall '|,$ where A' is the transpose of matrix A.

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25. If $A = \begin{vmatrix} 3 & 10 \\ 2 & 7 \end{vmatrix}$ then write A^{-1}.

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26. If A is a square matrix of order 3 such that |adj A|=225 find |A'|

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27. Write the inverse of the matrix $\begin{vmatrix} \cos\theta & \sin\theta \\ -\sin\theta & \cos\theta \end{vmatrix}$.

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28. The value of the determinant of a matrix A of order 3×3 is 4. Find the value of |5A|.

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29. For what value of x, the matrix $\begin{vmatrix} 1+x & 8 \\ 3-x & 8 \end{vmatrix}$ is a singular matrix?

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30. If $\text{Delta} = |5308201123|$, write the minor of the element a_{23}

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31. If $\text{Delta} = |5308201123|$, write the minor of the element a_{23}

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32. If $\Delta = \begin{vmatrix} 1 & 2 & 3 \\ 2 & 0 & 1 \\ 5 & 3 & 8 \end{vmatrix}$ Write the minor of the element a_{22}.

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33. Let A be a square matric of order 3×3 . Write the value of $2A$, where $A = 4$.

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34. A matrix A of order 3×3 is such that $|A| = 4$. Find the value of $|2A|$.

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35. Write the value of the following determinant: $|10218361341736|$

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36. For what value of x is the matrix $[6 - x43 - x1]$ singular?

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37. For what value of x is the matrix $\begin{vmatrix} 2x & 4 \\ x+2 & 3 \end{vmatrix}$ singular.

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38. For what value of x is the matrix $\begin{vmatrix} 1+x & x+4 \\ 5 & 8 \end{vmatrix}$ a singular matrix.

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39. IF $A = \begin{vmatrix} 3 & 4 \\ 1 & 2 \end{vmatrix}$ find the value of 3|A|.

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40. For what value of x is the matrix $\begin{vmatrix} 2x+4 & 4 \\ x+5 & 3 \end{vmatrix}$ a singular matrix.

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41. For what value of x is $A = \begin{vmatrix} 2(x+1) & 2x \\ x & x-2 \end{vmatrix}$ a singular matrix?

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42. For what value of y is the matrix $A = \begin{vmatrix} y^2+6 & 2y \\ y+3 & 2 \end{vmatrix}$ a singular matrix?

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43. If $A = \begin{bmatrix} 2 & 5 \\ 1 & 3 \end{bmatrix}$, find adj A.

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44. For what value of x, the matrix $[5 - \times + 124]$ is singular?

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45. Evaluate $\begin{vmatrix} \cos 15^\circ & \sin 15^\circ \\ \sin 75^\circ & \cos 75^\circ \end{vmatrix}$

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46. If $A = [235 - 2]$, write A^{-1} in terms of A.

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47. If $| \times 1x| = |3412|$, write the positive value of x.

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48. For what value of a, $\begin{vmatrix} 2a & -1 \\ -8 & 3 \end{vmatrix}$ is a singular matrix?

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49. A square matrix A, of order 3, has |A|=5, find |A.adj A|.

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50. What is the value of $|3I_3|$ where I_3 is the identity matrix of order 3?

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51. for what value of x the matrix $\begin{bmatrix} 2-x & 3 \\ -5 & 1 \end{bmatrix}$ is not invertible

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52. Find x, if $\begin{vmatrix} 3 & 4 \\ -5 & 2 \end{vmatrix} = \begin{vmatrix} 2x & 4 \\ -5 & 3 \end{vmatrix}$

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53. If A is square matrix of order 3 such that $|adj\ A| = 64$, find $|A|$.

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54. IF $A = \begin{vmatrix} 3 & 1 \\ 2 & -3 \end{vmatrix}$ then find A^{-1}.

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55. For what value of x is the matrix $\begin{bmatrix} 2x & 4 \\ x+2 & 3 \end{bmatrix}$ singular.

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56. If $|A| = 2$, where A is 2×2 matrix, find $|adj\ A|$.

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Topic 1 Determinants Minors Cofactors Short Answer Type Questions Ii

1. The area of a triangle with vertices $(-2, 0), (0, k)$ and $(0, 4)$ is 4 square units.Then the values of K will be

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2. Find the equation of a line passing through (3,1) and (9,3) using determinants.

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3. (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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4. Prove that the points (a+b+c),(b,c+a) and (c,a+b) are collinear.

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

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6. Without expanding, find the value of $\begin{vmatrix} \cos ec^2\theta & \cot^2\theta & 1 \\ \cot^2\theta & \cos ec^2\theta & -1 \\ 42 & 40 & 2 \end{vmatrix}$

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Topic 1 Determinants Minors Cofactors Long Answer Type Questions I

1. Using properties of determinants, prove the following:

$|1 \times^2 x^2 1 \times x^2 1| = (1 - x^3)^2$

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2. Using properties of determinants, prove the following: $|1 \times^2 x^2 1 \times x^2 1| = (1 - x^3)^2$

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3. Prove that $\begin{vmatrix} 1+a & 1 & 1 \\ 1 & 1+b & 1 \\ 1 & 1 & 1+c \end{vmatrix} = abc + bc + ca + ab$

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4. 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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5. Prove that : $\begin{vmatrix} x+y+2z & x & y \\ z & y+z+2x & y \\ z & x & x+a+2y \end{vmatrix} = 2(x+y+)^3$

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6. Prove that : $\begin{vmatrix} x+y+2z & x & y \\ z & y+z+2x & y \\ z & x & x+a+2y \end{vmatrix} = 2(x+y+)^3$

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

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8. Show that

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

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

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11. Using properties of determinants, prove that

$|a + xyzxa + yzxya + z| = a^2(a + x + y + z)$

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12. Using Properties of determinants, prove that

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

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13. Prove that :

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

(ii) 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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14. Prove: $|2yy - z - x2y2z2zz - x - yx - y - z2x2x| = (x+y+z)^3$

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15. Using Properties of determinants, prove that:

$\begin{vmatrix} x^2+1 & xy & yz \\ xy & y^2+1 & yz \\ xz & yz & z^2+1 \end{vmatrix} = 1 + x^2 + y^2 + z^2$

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16. Prove that: $\begin{vmatrix} a^2+1 & ab & ac \\ ab & b^2+1 & bc \\ ac & bc & c^2+1 \end{vmatrix} = 1+a^2+b^2+c^2$

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17. Using Properties of determinants, prove that

$$\begin{vmatrix} x+y & x & x \\ 5x+4y & 4x & 2x \\ 10x+8y & 8x & 3x \end{vmatrix} = x^3$$

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18. Using Properties of determinants, prove that:

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

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19. IF $a+b+c \neq 0$ and $\begin{vmatrix} a & b & c \\ b & c & a \\ c & a & b \end{vmatrix}$=0, then using properties of determinants, prove that $a=b=c$

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

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21. Prove that:

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

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

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

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

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22. Prove that : $\begin{vmatrix} a & b & c \\ a^2 & b^2 & c^2 \\ bc & ca & ab \end{vmatrix} = (a-b)(b-c)(c-a)(ab+bc+ca)$

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23. 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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24. Using properties of determinants, prove the following:

$| \times + yx + 2y\,x + 2y \times + yx + yx + 2yx| = 9y^2(x+y)$

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25. Using properties of determinants, prove the following:

$|\alpha\beta\gamma\alpha^2\beta^2\gamma^2\beta+\gamma\gamma+\alpha\alpha+\beta| = (\alpha-\beta)(\beta-\gamma)(\gamma-\alpha)(\alpha+\beta+\gamma)$

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26. 15. Using properties of determinants, prove the following

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

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27. $\begin{bmatrix} b+c & a-b & a \\ c+a & b-c & b \\ a+b & c-a & c \end{bmatrix} = 3abc - a^3 - b^3 - c^3$

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28. Prove that

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

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29. Prove that

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

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30. Using properties of determinants, prove that

$$|b+cq+ry+zc+ar+pz+xc+bp+qx+y| = 2\,|apxbqycrz|$$

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31. Using the Properties of determinants, prove that following:

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

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32. Using the Properties of determinants, prove the following:

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

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33. If $\begin{vmatrix} x & x^2 & 1+x^3 \\ y & y^2 & 1+y^3 \\ z & z^2 & 1+z^3 \end{vmatrix} = 0$ and x, y, z are all distince, then xysz equals

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34. Using properties of determinants, solve the following for x:

$|x-22x-33x-4x-42x-93x-16x-82x-273x-64|=0$

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35. Using properties of determinants, solve for

$x:|a+xa-xa-xa-xa+xa-xa-xa-xa+x|=0$

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36. Using Properties of determinants, solve the following for x:

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

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37. Prove, using properties of determinants:

$|y+kyyyy+kyyyy+k|=k^2(3y+k)$

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38. Prove $\begin{vmatrix} -bc & b^2+bc & c^2+bc \\ a^2+ac & -ac & c^2+ac \\ a^2+ab & b^2+ab & -ab \end{vmatrix}$=$(ab+bc+ca)^2$

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39. Prove that:

$$\left|(b+c)^2a^2a^2b^2(c+a)^2b^2c^2c^2(a+b)^2\right| = 2abc(a+b+c)^2$$

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40. $\begin{vmatrix} b+c & c+a & a+b \\ c+a & a+b & b+c \\ a+b & b+c & c+a \end{vmatrix} = 2\left(3abc-a^3-b^3-c^3\right)$

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41. Prove, using Properites of determinants,

$$\begin{vmatrix} a+bx^2 & c+dx^2 & p+qx^2 \\ ax^2+b & cx^2+d & px^2+q \\ u & v & w \end{vmatrix} = (x^4-1)\begin{vmatrix} b & d & q \\ a & c & p \\ u & v & w \end{vmatrix}$$

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Topic 1 Determinants Minors Cofactors Long Answer Type Question Ii

1. Prove that $\begin{bmatrix} 1 & ab & a+b \\ 1 & bc & b+c \\ 1 & ca & c+a \end{bmatrix} = (a-b)(b-c)(c-a)$

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2. Using properties of determinants, prove the following:

$$\left| \times^2 1 + px^3 yy^2 1 + py^3 zz^2 1 + pz^3 \right| = (1+pxyz)(x-y)(y-z)(z-x)$$

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3. 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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Topic 2 Solutions Of System Of Linear Equations Long Answer Type Questions Ii

1. If $A = \begin{pmatrix} 2 & -3 & 5 \\ 3 & 2 & -4 \\ 1 & 1 & -2 \end{pmatrix}$ find A^{-1}. Use it to solve the system of equations $2x - 3y + 5z = 11$, $3x + 2y - 4z = -5$ and $x + y - 2z = -3$

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2. Solve the following system of equations by matrix method:

$x + y + z = 6, x - y - z = -4 \text{ and } x + 2y - 2z = -1.$

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3. Solve the equations $x - y + 3z = 10, x - y - z = -2$ and $2x + 3y + 4z = 4$ by matrix method.

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4. Solve by matrix method:

$x + y + z = 6$

$x - 2y + 3z = 6$

$x - y + z = 2$

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5. Solve by matrix Method:

$x + 2y + 3z = 2$

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

$x - y - z = -2$

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

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7. Solve the following system of equation by using matrix method :

$x + y + z = 6, y + 3z - 11 = 0$ and $x + z = 2y.$

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

$3x2y + 3z = 82x + y - z = 14x - 3; y + 2z = 4$

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9. If $A = \begin{pmatrix} 2 & -3 & 5 \\ 3 & 2 & -4 \\ 1 & 1 & -2 \end{pmatrix}$ find A^{-1}. Use it to solve the system of equations $2x - 3y + 5z = 11$, $3x + 2y - 4z = -5$ and $x + y - 2z = -3$

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10. Solve the following system of linear equations by matrix method.

x-y+2z=7

3x+4y-5z=-5

2x-y+3z=12

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

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12. If $A = \begin{bmatrix} 1 & 2 & -3 \\ 2 & 3 & 2 \\ 3 & -3 & -4 \end{bmatrix}$ then find A^{-1} and hence solve the follwoing equations: $x + 2y - 3z = 4, 2x + 3y + 2z = 2$ and $3x - 3y - 4z = 11$

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13. Determine the product $[(- 444), (- 713) \text{ and } (5 - 3 - 1)][(1 - 11), (1 - 2 - 2) \text{ and } (213)]$ and use it to solve the system of equations $x - y + z = 4, x - 2y - 2z = 9, 2x + y + 3z = 1$

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14. Given $A = [22 - 4 - 42 - 42 - 15], B = [1 - 10234012]$, find BA and use this to solve the system of equations: $y + 2x = 7, x - y = 3, 2x + 3y + 4z = 17$

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15. IF $A = \begin{bmatrix} 1 & 2 & 5 \\ 1 & -1 & -1 \\ 2 & 3 & -1 \end{bmatrix}$ find A^{-1} Hence solve the following system of equations:

$x + 2y + 5z = 10, x - y - z = -2, 2x + 3y - z = -11$

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16. Using matrices, solve the following system of linear equations:

$x - y + 2z = 7 \; 3x + 4y - 5z = -5 \; 2x - y + 3z = 12$

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17. Solve the following system of equations by matrix method :

$x + y - z = 3, 2x + 3y + z = 10, 3x - y - 7z = 1$

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18. Using matrices, solve the following system of linear equations:

$x - y + z = 4, 2x + y - 3z = 0, x + y + z = 2$

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19. 3x-4y+2z=-1

2x+3y+5z=7

x+z=2

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20. If $A = \begin{bmatrix} 1 & -2 & 0 \\ 2 & 1 & 3 \\ 0 & -2 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} 7 & 2 & -6 \\ -2 & 1 & -3 \\ -4 & 2 & 5 \end{bmatrix}$, find AB

Hence , solve the system of equation

x-2y=10, 2x+y+3z=8 and -2y+z=7.

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21. Using matrix method, solve the following system of equations: $\frac{2}{x} + \frac{3}{y} + \frac{10}{z} = 4, \frac{4}{x} - \frac{6}{y} + \frac{5}{z} = 1, \frac{6}{x} + \frac{9}{y} - \frac{20}{z} = 2; x, \ y, \ z \neq 0$

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22. 4x+3y+2z=60

x+2y+3z=45

6x+2y+3z=70

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23. Using matrices, solve the following system of equations : $x + 2y + z = 7, x + 3z = 11, 2x - 3y = 1$

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24. Use product $[1 - 1202 - 33 - 24]$ $[-20192 - 361 - 2]$ to solve the system of equation: $x - y + 2z = 1$ $2y - 3z = 1$ $3x - 2y + 4z = 2$

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