MATHS

BOOKS - MODERN PUBLICATION

DETERMINANTS

Example

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

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2. If $\begin{vmatrix} 3x & 7 \\ 6 & 4 \end{vmatrix} = \begin{vmatrix} 8 & 7 \\ 6 & 4 \end{vmatrix}$, find the value of 'x'.

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

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4. Write the value $\begin{vmatrix} x & x+1 \\ x-1 & x \end{vmatrix}$

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5. Expand :

$\begin{vmatrix} 3 & -5 & 4 \\ 7 & 6 & 1 \\ 1 & 2 & 3 \end{vmatrix}$ by two methods.

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6. If $\begin{vmatrix} x & 2 \\ 8 & x \end{vmatrix} = \begin{vmatrix} 3 & 2 \\ 9 & 6 \end{vmatrix}$, then the value of 'x' is .... (fill in the blanks).

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7. If $\begin{vmatrix} 2 & 3 \\ 4 & 5 \end{vmatrix} = \begin{vmatrix} x & 3 \\ 2x & 5 \end{vmatrix}$, then the value of 'x' is ....

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

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

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10. If $A = [(1, 2), (4, 2)\}$, then find the value of 'k' if |2A| = k|A|.

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

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12. Evaluate the following determinants:

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

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13. Evaluate the following determinants:

$$\begin{vmatrix} -2 & 3 \\ 4 & -9 \end{vmatrix}$$

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14. Evaluate $\begin{vmatrix} 2\cos\theta & -2\sin\theta \\ \sin\theta & \cos\theta \end{vmatrix}$

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15. Evaluate the determinant: $\begin{vmatrix} \cos\theta & -\sin\theta \\ \sin\theta & \cos\theta \end{vmatrix}$

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16. Evaluate the following determinants:

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

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17. Find the value of x, if $\begin{vmatrix} 2 & 3 \\ 4 & 5 \end{vmatrix} = \begin{vmatrix} x & 3 \\ 2x & 5 \end{vmatrix}$.

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18. Evaluate the following determinants:

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

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19. Evaluate the following determinants:

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

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20. Evaluate the following determinants:

$$\begin{vmatrix} 2x & 3 \\ 5 & 2 \end{vmatrix} = \begin{vmatrix} 16 & 3 \\ 5 & 2 \end{vmatrix}, x > 0$$

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21. If $\begin{vmatrix} x+1 & x-1 \\ x-3 & x+2 \end{vmatrix} = \begin{vmatrix} 4 & -1 \\ 1 & 3 \end{vmatrix}$ find the value of x.

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22. Evaluate the following determinants:

$$\begin{vmatrix} -1 & 2 \\ 4 & 8 \end{vmatrix} = \begin{vmatrix} 2 & x \\ x & -4 \end{vmatrix}$$

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23. If $\begin{vmatrix} x & x \\ 1 & 2 \end{vmatrix} = \begin{vmatrix} 3 & 4 \\ 1 & 2 \end{vmatrix}$ then find positive value of x.

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24. If $\begin{vmatrix} 2 & 3 \\ 4 & 5 \end{vmatrix} = \begin{vmatrix} x & 3 \\ 2x & 5 \end{vmatrix}$, then the value of 'x' is ....

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25. Evaluate the following determinants:

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

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26. Evaluate the following Determinats

$$\begin{vmatrix} 4 & 9 & 7 \\ 3 & 5 & 7 \\ 5 & 4 & 5 \end{vmatrix}$$

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27. Evaluate the determinant $\Delta = \begin{vmatrix} 2 & -1 & -2 \\ 0 & 2 & -1 \\ 3 & -5 & 0 \end{vmatrix}$.

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28. Evaluate $\begin{bmatrix} 1 & 3 & 5 \end{bmatrix} \begin{bmatrix} 1 & 0 & 3 \\ 2 & 0 & 1 \\ 0 & 1 & 2 \end{bmatrix} \begin{bmatrix} 1 \\ 4 \\ 6 \end{bmatrix}$

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29. Evaluate the determinant : $\begin{vmatrix} 3 & -4 & 5 \\ 1 & 1 & -2 \\ 2 & 3 & 1 \end{vmatrix}$

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30. Evaluate the following determinants :

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

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31. Evaluate the following determinants :

$$\begin{vmatrix} 0 & 2 & 0 \\ 2 & 3 & 4 \\ 4 & 5 & 6 \end{vmatrix}$$

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32. If $A = \begin{bmatrix} 1 & 1 & -2 \\ 2 & 1 & -3 \\ 4 & 5 & 6 \end{bmatrix}$, find |A|.

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33. If $A = \begin{bmatrix} 2 & 1 & 1 \\ 1 & 2 & 1 \\ 1 & 1 & 2 \end{bmatrix}$, then show that $|4A| = 64|A|$.

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34. Prove that :

$|(1!, 2!, 3!), (2!, 3!, 4!), (3!, 4!, 5!)] = 4!$

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35. Find the maximum value of :

$$\begin{vmatrix} 1 & 1 & 1 \\ 1 & 1+\sin\theta & 1 \\ 1 & 1 & 1+\cos\theta \end{vmatrix}$$

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36. If A is a square matrix of order 3 and |3A| = k|A|, then write the value of 'k'.

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37. let A be a square matrix of order 3×3, Write the value of |2A|, where |A| = 4.

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38. Prove that: $\begin{vmatrix} a+b & b+c & c+a \\ b+c & c+a & a+b \\ c+a & a+b & b+c \end{vmatrix} = 2\begin{vmatrix} a & b & c \\ b & c & a \\ c & a & b \end{vmatrix}$

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39. Without expanding, prove that the following determinants vanish:

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

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40. Without expanding, prove that the following determinants vanish:

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

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41. If a,b,c, are in A.P., then the determinant `|{:(x+2,x+3,x+2a),(x+3,x+4,x+2b),(x+4,x+5,x+2c):}| is

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42. If $f(x) = \begin{vmatrix} a & -1 & 0 \\ ax & a & -1 \\ ax^2 & ax & a \end{vmatrix}$, using properties of determinants, find the value of $f(2x) - f(x)$

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43. Prove that: $\begin{vmatrix} x+y & x & x \\ 5x+4y & 4x & 2x \\ 10x+8y & 8x & 3x \end{vmatrix} = x^3.$

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44. Without expanding, prove the following

$$\begin{vmatrix} y+z & z & y \\ z & z+x & x \\ y & x & x+y \end{vmatrix} = 4xyz$$

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45. Prove that: $\begin{vmatrix} a+b+2c & a & b \\ c & b+c+2a & b \\ c & a & c+a+2b \end{vmatrix} = 2(a+b+c)^3$

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46. If x,y,z are different and $\Delta = \begin{vmatrix} x & x^2 & 1+x^3 \\ y & y^2 & 1+y^3 \\ z & z^2 & 1+z^3 \end{vmatrix} = 0$, show that xyz=-1

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47. Using properties of determinants, prove that 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 $1 + xyz = 0$.

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48. Show that $\begin{vmatrix} 1+a & 1 & 1 \\ 1 & 1+b & 1 \\ 1 & 1 & 1+c \end{vmatrix} = abc\left(1 + \frac{1}{a} + \frac{1}{b} + \frac{1}{c}\right) = abc + bc + ca + ab$

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49. Using the properties of determinants show that : $\left|\begin{bmatrix} 1 & 1 & 1 \\ a^2 & b^2 & c^2 \\ a^3 & b^3 & c^3 \end{bmatrix}\right| = (a-b)(b-c)(c-a)(ab+bc+ca).$

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50. Prove that:

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

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51. 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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52. By using properties of determinants, show 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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53. Using the properties of determinants, find the value of x, if:

$$\begin{vmatrix} x+2 & x+6 & x-1 \\ x+6 & x-1 & x+2 \\ x-1 & x+2 & x+6 \end{vmatrix} = 0$$

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54. Using properties of determinants, prove that :

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

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55. Find the product of the determinants:

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

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56. Express:

$$\begin{vmatrix} 1 & \cos(\beta-\alpha) & \cos(\gamma-\alpha) \\ \cos(\alpha-\beta) & 1 & \cos(\gamma-\beta) \\ \cos(\alpha-\gamma) & \cos(\beta-\gamma) & 1 \end{vmatrix}$$ as the product of two determinants and hence prove that the determinant vanishes.

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57. Prove that :

$$\begin{vmatrix} a_1x_1+b_1y_1 & a_1x_2+b_1y_2 & a_1x_3+b_1y_3 \\ a_2x_1+b_2y_1 & a_2x_2+b_2y_2 & a_2x_3+b_2y_3 \\ a_3x_1+b_3y_1 & a_3x_2+b_3y_2 & a_3x_3+b_3y_3 \end{vmatrix}$$

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58. Prove that :

$$\begin{vmatrix} 2y_1z_1 & y_1z_2+y_2z_1 & y_1z_3+y_3z_1 \\ y_1z_2+y_2z_1 & 2y_2z_2 & y_2z_3+y_3z_2 \\ y_1z_3+y_3z_1 & y_2z_3+y_3z_2 & 2y_3z_3 \end{vmatrix}=0$$

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59. If l_1, m_1, n_1 and l_2, m_2, n_2 are the direction cosines of two mutually perpendicular lines, show that the direction cosines of the line perpendicular to both of these are $m_1n_2 - m_2n_1, n_1l_2 - n_2l_1, l_1m_2 - l_2 - m_1$

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60. Find the area of triangle with vertices: (3,8),(-4,2),(5,1)

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61. By using determinants, find the value of 'y' for which the points (1,3), (2,5) and (3,y) are collinear.

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62. A triangle has its three sides equal to a,b and c. If the co-ordinates of its vertices are $A(x_1y_1), B(x_2, y_2)$ and $C(x_3, y_3)$, show that

$$\begin{vmatrix} x_1 & y_1 & 2 \\ x_2 & y_2 & 2 \\ x_3 & y_3 & 2 \end{vmatrix}^2 = (a+b+c)(b+c-a)(c+a-b)(a+b-c)$$

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63. If $\Delta = \begin{vmatrix} 5 & 3 & 8 \\ 2 & 0 & 1 \\ 1 & 2 & 3 \end{vmatrix}$, write the minor of the element a_{23}

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64. If $\Delta = \begin{vmatrix} 5 & 3 & 8 \\ 2 & 0 & 1 \\ 1 & 2 & 3 \end{vmatrix}$, write the co-factor of the element a_{32}

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65. Find the minor of element 6 in the determinant $\triangle = \begin{vmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{vmatrix}$

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

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

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67. If A_{ij} is the co-factor of the element a_{ij} of the determinant

$\begin{vmatrix} 2 & -3 & 5 \\ 6 & 0 & 4 \\ 1 & 5 & -7 \end{vmatrix}$, then write the value of a_{32}, A_{32}

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68. Find the minors and co-factors of the elements a_{11}, a_{21} and $a_{31} of the \det er \min ant$: {:|(a_11,a_12,a_13),(a_21,a_22,a_23),(a_31,a_32,a_33)|`

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69. For what value of 'k', the system of linear equations :

x+y+z=2,2x+y-z=3 and 3x+2y+kz=4 has a unique solution.

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70. Using Cramer's Rule, solve the following linear equations:

3x-2y=5,x-3y=-3

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71. Examine whether the system of equations: 2x-y=5,4x-2y=10 is consistent or inonsistent.

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72. Examine the consistency of the system of equations : $3x-y-2z=2, 2y-2z=-1, 3x-5y=3$

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73. Solve : x+y+z =1, 2x+2y+2z=3, 3x+3y+3z=4

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74. Using Cramer's Rule, solve the following linear equations:

{:(3x-2y=5),(x+y-2z=-1),(2x+3y+z=5)`

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75. Solve: 2x-y+z=4,x+3y+2z=12,3x+2y+3z=16

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76. Solve the following system of homogeneous equations:

x+y-2z=0 ,2x+y-3z=0 ,5x+4y-9z=0

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77. Find the quadratic function defined by the equation :

$f(x) = ax^2 + bx + c$ if f(0) = 6,f(2) = 11 and f(-3) = 6

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78. Find the adjoint of the following matrices :

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

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79. If A is a square matrix of order 3 and |A| = 7, then |adj A| equals :

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80. Write $A^{-1} of A = \begin{bmatrix} 2 & 5 \\ 1 & 3 \end{bmatrix}$

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81. For what value of x is the matrix $\begin{bmatrix} 5-x & x+1 \\ 2 & 4 \end{bmatrix}$ singular ?

82. If $A = \begin{bmatrix} 1 & 2 & 3 \\ 2 & 3 & 2 \\ 3 & 3 & 4 \end{bmatrix}$, find adj.A.

83. For the matrix $A = \begin{bmatrix} 1 & -1 \\ 3 & 2 \end{bmatrix}$, show that $A^2 - 4A + 7I = O$. Hence, obtain A^{-1}.

84. 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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85. Find the inverse of the matrix : $A = \begin{bmatrix} 0 & 1 & 2 \\ 0 & 1 & 1 \\ 1 & 0 & 2 \end{bmatrix}$.

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86. If $A = \begin{bmatrix} 1 & -2 & 3 \\ 0 & -1 & 4 \\ -2 & 2 & 1 \end{bmatrix}$, find $(A')^{-1}$

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

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88. If $A = \begin{bmatrix} 1 & 2 & 3 \\ 1 & 1 & 3 \\ 1 & 2 & 4 \end{bmatrix}$, verify A.(Adj.A) = |A| I and find A^{-1}.

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89. If $A = \begin{bmatrix} 0 & 4 & 3 \\ 1 & -3 & -3 \\ -1 & 4 & 4 \end{bmatrix}$, show that $A^2 = I$ and hence, find A^{-1}

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90. Compute $(AB)^{-1} : A = \begin{bmatrix} 1 & 1 & 2 \\ 0 & 2 & -3 \\ 3 & -2 & 4 \end{bmatrix}, B^{-1} = \begin{bmatrix} 1 & 2 & 0 \\ 0 & 3 & -1 \\ 1 & 0 & 2 \end{bmatrix}$

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91. 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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92. Use matrix method to show that the system of equations x + 2y = 9, 2x+4y = 7 is inconsistent.

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93. Solve the following system of equations, by matrix method: 3x-4y=5 and 4x+2y = 3.

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94. Solve the system of equations by matrix method :

$4x + 3y + 2z = 60, x + 2y + 3z = 45, 6x + 2y + 3z = 70$

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95. Solve the following equation by Matrix Method, $\frac{4}{x}+\frac{2}{y}+\frac{3}{z}=2, \frac{1}{x}+\frac{1}{y}+\frac{1}{z}=1, \frac{3}{x}+\frac{1}{y}-\frac{2}{z}=5$

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96. Using elementary transformations, find the inverse of the matrix:

$A=\begin{bmatrix}8 & 4 & 3\\ 2 & 1 & 1\\ 1 & 2 & 2\end{bmatrix}$ and use it to solve the following system of equations:

$8x+4y+3z=19$

$2x+y+z=5$

$x+2y+2z=7$

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97. 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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98. Solve the following system of linear equations by matrix method :

$2x + y - z = 0, 3x + y + z = 3, x - 2y + 2z = 5$

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

$2x + y - 3z = 13, x + y - z = 6, x - y + 4z = -12$

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100. Solve the following systems of homogenous equations:

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

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101. Solve the following systems of homogenous equations:

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

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102. 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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103. Base radius of two cylinder are in the ratio 2 : 3 and their heights are in the ratio 5 : 3. The ratio of their volumes is :

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104. Two schools A and B want to award their selected students on the values of sincerity, truthfulness and helpfulness. The school A wants to award Rs. X and Rs y each and Rs Z each of the three respective values to 3,2 and 1 students respectively with a total award money of Rs 1600. School B wants to spend Rs 2300 to award its 4,1 and 3 students on respective values (b giving the same award money for the three values as before). If the total amount of award for one prize on each value is $Rs900$, using matrices find the award money for each value. Apart from these three values, suggest one more value which should be considered for award.

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105. Two schools A and B want to award their selected students on the values of sincerity, truthfulness and helpfulness. The school A wants to award Rs. X and Rs y each and Rs Z each of the three respective values to 3,2 and 1 students respectively with a total award money of Rs 1600. School B wants to spend Rs 2300 to award its 4,1 and 3 students on respective values (b giving the same award money for the three values as before). If the total amount of award for one prize on each value is $Rs900$, using matrices find the award money for each value. Apart from these three values, suggest one more value which should be considered for award.

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106. Two schools A and B decided to award prizes to their students for three values, team spirit, truthfulness and tolerance at the rate of R sdotx ,R sdoty and R sdotz per student respectively. School A , decided to award a total of Rs. 1,100 for the three values to 3, 1 and 2 students respectively while school B decided to award Rs. 1,400 for the three values to 1, 2 and 3 students respectively. If one prize for all the three values together amount to Rs. 600 then Represent the above situation by a matrix equation after forming linear equations.

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107. Two schools A and B decided to award prizes to their students for three values, team spirit, truthfulness and tolerance at the rate of R sdotx ,R sdoty and R sdotz per student respectively. School A , decided to award a total of Rs. 1,100 for the three values to 3, 1 and 2 students respectively while school B decided to award Rs. 1,400 for the three values to 1, 2 and 3 students respectively. If one prize for all the three values together amount to Rs. 600 then Represent the above situation by a matrix equation after forming linear equations.

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108. The management committee of a residential colony decided to award some of its members (say x) for honesty, some (say y) for helping others and some other (sayz) for supervising the workers to keep the colony neat and clean. The sum of all the awardees is 12. Three times the sum of the awardees for cooperation and supervision added to two times the number of awardees for honesty is 33. If the sum of the number of awardees for honesty and supervision is twice the number of awardees for helping others. Using matrix method, find the number of awardees of each category, Apart form these values, namely honesty, cooperation and supervisio, suggest one more value, which the management of the colony must include for award.

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109. Evaluate the determinants

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

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110. Evaluate the determinants

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

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111. Evaluate the determinants

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

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

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113. 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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114. Evaluate the determinants

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

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115. Evaluate the determinants

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

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116. Evaluate the determinants

$$\begin{vmatrix} 0 & 2 & 5 \\ 4 & 0 & -2 \\ 1 & 6 & 0 \end{vmatrix}$$

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117. Evaluate the determinant $\Delta = \begin{vmatrix} 2 & -1 & -2 \\ 0 & 2 & -1 \\ 3 & -5 & 0 \end{vmatrix}$.

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118. If $A = \begin{bmatrix} 1 & 1 & -2 \\ 2 & 1 & -3 \\ 4 & 5 & 6 \end{bmatrix}$, find |A|.

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119. Find values of x, if : $\begin{vmatrix} 2 & 4 \\ 5 & 1 \end{vmatrix} = \begin{vmatrix} 2x & 4 \\ 6 & x \end{vmatrix}$

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120. Find the value of x, if $\begin{vmatrix} 2 & 3 \\ 4 & 5 \end{vmatrix} = \begin{vmatrix} x & 3 \\ 2x & 5 \end{vmatrix}$.

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121. If $\begin{vmatrix} x & 2 \\ 18 & x \end{vmatrix} = \begin{vmatrix} 6 & 2 \\ 18 & 6 \end{vmatrix}$, then x is equal to:

A. 6

B. ± 6

C. -6

D. 0

Answer:

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122. Using the property of determinants and without expanding , prove that: $\begin{vmatrix} x & a & x+a \\ y & b & y+b \\ z & c & z+c \end{vmatrix} = 0$

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123. Using the property of determinants and without expanding , 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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124. Using the property of determinants and without expanding , prove that: $\begin{vmatrix} 2 & 7 & 65 \\ 3 & 8 & 75 \\ 5 & 9 & 86 \end{vmatrix} = 0$

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125. Using the property of determinants and without expanding , prove that: $|[1, bc, a(b+c)], [1, ca, b(c+a)], [1, ab, c(a+b] \ | \ = 0$

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126. Using the property of determinants and without expanding prove that :

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

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127. By using properties of determinants, Show that :

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

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128. 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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129. By using properties of determinants, show that :

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

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130. 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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131. By using properties of determinants, show 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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132. using properties of determinant, 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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133. 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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134. By using properties of determinants, show 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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135. Without expanding, prove the following

$\begin{vmatrix} 1+a^2-b^2 & 2ab & -2b \\ 2ab & 1-a^2+6^2 & 2a \\ 2a & -2a & 1-a^2-b^2 \end{vmatrix} = (1+a^2+b^2)$^3

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136. Using the properties of determinant, show 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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137. Let A be a square matrix of order 3×3. Then I kA I is equal to :

A. K|A|

B. $k^2|A|$

C. $k^3|A|$

D. 2k|A|

Answer:

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138. 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:

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139. Find area of the triangle with vertices at the point given in the following : $(2, 7), (1, 1), (10, 8)$

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140. Find area of the triangle with vertices at the point given in the following : $(-2, -3), (3, 2), (-1, -8)$

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141. Show that points : A $(a, b+c)$, $B(b, c+a)$, $C(c, a+b)$ are collinear.

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142. Find the value of k if the area of the triangle is 4 sq. units whose vertices are : (k, 0), (4, 0), (0, 2).

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

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

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145. If area of triangle is 35 sq. units with vertices (2,-6), (5, 4) and (k,4) then k is :

A. 12

B. -2

C. $-12, \ -2$

D. $12, \ -2$

Answer:

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146. Write Minors and Cofactors of the elements of following determinant : $\begin{vmatrix} 2 & -4 \\ 0 & 3 \end{vmatrix}$

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147. Write Minors and Cofactors of the elements of following determinant : $\begin{vmatrix} a & c \\ b & d \end{vmatrix}$

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148. Write Minors and Cofactors of the elements of followig determinants:

$$\begin{vmatrix} 2 & 0 & 0 \\ 0 & 2 & 0 \\ 0 & 0 & 2 \end{vmatrix}$$

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149. Write Minors and Cofactors of the elements of followig determinants:

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

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150. Using Cofactors of elements of second row, evaluate

$$\triangle = \begin{vmatrix} 5 & 3 & 8 \\ 2 & 0 & 1 \\ 1 & 2 & 3 \end{vmatrix}$$

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151. Using Cofactors of elements of third column, evaluate

$$\triangle - \begin{vmatrix} 1 & x & yz \\ 1 & y & zx \\ 1 & z & xy \end{vmatrix}$$

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152. Find adjoint of each of the matrices :

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

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153. Find adjoint of each of the matrices :

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

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154. Verify $A(adjA) = (adjA).\,A = |A|.\,I : \begin{bmatrix} 2 & 3 \\ -4 & -6 \end{bmatrix}$

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155. Verify $A(adjA) = (adjA).\,A = |A|.\,I : \begin{bmatrix} 1 & -1 & 2 \\ 3 & 0 & -2 \\ 1 & 0 & 3 \end{bmatrix}$

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156. Find the inverse of the matrix (if it exists): $\begin{bmatrix} 2 & -2 \\ 4 & 3 \end{bmatrix}$

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157. Find the inverse of the matrix (if it exists): $\begin{bmatrix} -1 & 5 \\ -3 & 2 \end{bmatrix}$

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158. Find the inverse of the matrix (if it exists): $\begin{bmatrix} 1 & 2 & 3 \\ 0 & 2 & 4 \\ 0 & 0 & 5 \end{bmatrix}$

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159. Find the inverse of the matrix (if it exists): $\begin{bmatrix} 1 & 0 & 0 \\ 3 & 3 & 0 \\ 5 & 2 & -1 \end{bmatrix}$

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160. Find the inverse of the matrix (if it exists): $\begin{bmatrix} 2 & 1 & 3 \\ 4 & -1 & 0 \\ -7 & 2 & 1 \end{bmatrix}$

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161. Find the inverse of the matrix (if it exists): $\begin{bmatrix} 1 & -1 & 2 \\ 0 & 2 & -3 \\ 3 & -2 & 4 \end{bmatrix}$

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162. Find the inverse of the matrix (if it exists): $\begin{bmatrix} 1 & 0 & 0 \\ 0 & \cos\alpha & \sin\alpha \\ 0 & \sin\alpha & -\cos\alpha \end{bmatrix}$

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163. 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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164. For the matrix $A = \begin{bmatrix} 1 & -1 \\ 3 & 2 \end{bmatrix}$, show that $A^2 - 4A + 7I = O$. Hence, obtain A^{-1}.

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165. 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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166. 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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167. 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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168. Let A be a non-singular square matrix of order 3×3. Then abs(adjA) is

A. |A|

B. $|A|^2$

C. $|A|^3$

D. 3|A|

Answer:

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169. Select the Correct Option 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:

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170. Examine the consistency of the system of equations :

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

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171. Examine the consistency of the system of equations :

$2x - y = 5, x + y = 4$

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172. Examine the consistency of the system of equations :

$$x - 3y = 2$$
$$2x - 6y = 8$$

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173. Examine the consistency of the system of equations :

$x+y+z=1, 2x+3y+2z=2, ax+ay+2az=4$

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174. Examine the consistency of the system of equations :

$3x-y-2z=2, 2y-2z=-1, 3x-5y=3$

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175. Examine the consistency of the system of equations :

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

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176. Solve system of linear equations, using matrix method:

$5x+2y=4, 7x+3y=5$

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177. Solve system of linear equations, using matrix method:

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

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178. Solve system of linear equations, using matrix method:

$4x - 3y = 3, 3x - 5y = 7$

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179. Solve system of linear equations, using matrix method:

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

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180. 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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181. Solve the following system of linear equations by matrix method:

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

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182. Solve the following system of linear equations by matrix method :

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

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183. Solve the following equations, using inverse of a matrix:

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

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

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

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

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

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

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190. 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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191. 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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192. 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 $(AB)^{-1}$ I

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

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195. Prove that:

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

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

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197. Using properties of determinants, prove that:

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

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198. Using properties of determinants, 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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199. Using properties of determinants, prove that:

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

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200. 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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201. Solve by matrix method

$\frac{2}{x} + \frac{3}{y} + \frac{10}{z} = 4, \frac{4}{x} - \frac{6}{y} + \frac{5}{z} = 1, \frac{6}{x} + \frac{9}{y} - \frac{20}{z} = 2, x, y, z \neq 0$

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202. 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:

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

A. $Det(A) = 0$

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

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

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

Answer:

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204. Prove that $\begin{vmatrix} 1 & x & x^2 - yz \\ 1 & y & y^2 - zx \\ 1 & z & z^2 - xy \end{vmatrix} = 0$

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205. Without expanding, show that :

$$\Delta = \begin{vmatrix} \cos ec^2\theta & \cot^2\theta & 1 \\ \cot^2\theta & \cos ec^2\theta & -1 \\ 42 & 40 & 2 \end{vmatrix} = 0$$

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206. If A,B and C are the angles of a triangle and

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

then prove that Δ ABC must be isoceles.

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207. Show that if the determinant:

$$\Delta - \begin{vmatrix} 3 & -2 & \sin 3\theta \\ -7 & 8 & \cos 2\theta \\ -11 & 14 & 2 \end{vmatrix} = 0, \text{then } \sin\theta = 0 \text{ or } \frac{1}{2}$$

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

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209. If a, b, c, are in A.P, find value of $\triangle = \begin{vmatrix} 2y+4 & 5y+7 & 8y+a \\ 3y+5 & 6y+8 & 9y+b \\ 4y+6 & 7y+9 & 10y+c \end{vmatrix}$

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210. If $A+B+C=\pi$, find the value of

$|(\sin(A+B+C), \sin B, \cos C), (-\sin B, 0, \tan A), (\cos(A+B), -\tan$

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211. Using properties of determinants, 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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212. If $A = \begin{bmatrix} 3 & -3 & 4 \\ 2 & -3 & 4 \\ 0 & -1 & 1 \end{bmatrix}$, then

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213. If $A = \begin{bmatrix} 3 & -3 & 4 \\ 2 & -3 & 4 \\ 0 & -1 & 1 \end{bmatrix}$, show that $A^4 = I$, Hence find A^{-1}

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214. If $A = \begin{bmatrix} 1 & \tan x \\ -\tan x & 1 \end{bmatrix}$, show that :
$A'A^{-1} = \begin{bmatrix} \cos 2x & -\sin 2x \\ \sin 2x & \cos 2x \end{bmatrix}$

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215. If $A = \begin{bmatrix} 2 & -3 \\ 4 & 6 \end{bmatrix}$, verify that: $(Adj.\ A)^{-1} = \left(adj.\ A^{-1}\right)$

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216. Prove that:

$adj.\ I_n = I_n$

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217. Prove that:

$adj.\ O = O$

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218. Prove that:

$adj. I_n^{-1} = I_n$

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219. Let D = diag $[d_1, d_2, d_3]$ where none of d_1, d_2, d_3 is 0. prove that: $D^{-1} = diag[d_1^{-1}, d_2^{-1}, d_3^{-1}]$.

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220. Let $F(\alpha) = \begin{bmatrix} \cos\alpha & -\sin\alpha & 0 \\ \sin\alpha & \cos\alpha & 0 \\ 0 & 0 & 1 \end{bmatrix}$ and $G(\beta) = \begin{bmatrix} \cos\beta & 0 & \sin\beta \\ 0 & 1 & 0 \\ -\sin\beta & 0 & \cos\beta \end{bmatrix}$. Show that $[F(\alpha). G(\beta)]^{-1} = G(-\beta), F(-\alpha)$

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

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222. If $a \neq p, b \neq q, c \neq r$ and $\begin{vmatrix}p & b & c \\ a & q & c \\ a & b & r\end{vmatrix} = 0$, then find the value of $\dfrac{p}{p-a} + \dfrac{q}{q-b} + \dfrac{r}{r-c}$

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223. Let the three-digit numbers A28,3B9 and 62C, where A,B and C are integers between 0 and 9, be divisible by fixed integer K. Show that the determinant $\begin{vmatrix}A & 3 & 6 \\ 8 & 9 & C \\ 2 & B & 2\end{vmatrix}$ is divisible by k.

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

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225. If $\begin{vmatrix} x & 2 \\ 8 & x \end{vmatrix} = \begin{vmatrix} 3 & 2 \\ 9 & 6 \end{vmatrix}$, then the value of 'x' is .... (fill in the blanks).

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226. Answer in one word.

$$\begin{vmatrix} 3 & 1 & 9 \\ 5 & 2 & 15 \\ 7 & 4 & 21 \end{vmatrix}$$

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227. If any two rows (or columns) of a determinant are identical, the value of the determinant is zero.

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228. Without expanding the determinant, show that : $\left(\frac{1}{a}+\frac{1}{b}+\frac{1}{c}+1\right)$ is a factor of : $\left|\begin{bmatrix}1+a & 1 & 1\\ 1 & 1+b & 1\\ 1 & 1 & 1+c\end{bmatrix}\right|$

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229. If A is an invertible square matrix of order 4, then $|adj.\ A|$ is equal to :

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230. If A is a non-singular matrix of ordern, then |adj A| is equal to

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231. Find the inverse of $A=\begin{bmatrix}1 & -6\\ 1 & -2\end{bmatrix}$

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232. If A is a square matrix satisfying $A^2 = I$, then what is the inverse of A?

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233. Is the matrix $\begin{bmatrix} \pi & 22 \\ \frac{1}{7} & 1 \end{bmatrix}$ singular?

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Exercise

1. Let A be a square matrix of order 3×3, then prove that |kA|=k|A|.

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2. If any two rows (or columns) of a determinant are identical, the value of the determinant is zero.

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3. Answer in one word.

$$\begin{vmatrix} 3 & 1 & 6 \\ 5 & 2 & 10 \\ 7 & 4 & 14 \end{vmatrix}$$

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4. If A is a square matrix of order 3 and |3A| = k|A|, then write the value of 'k'.

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5. Write the value of the following determinant $\begin{vmatrix} a-b & b-c & c-a \\ b-c & c-a & a-b \\ c-a & a-b & b-c \end{vmatrix}$.

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6. Use properties of determinants ot evaluate:

$$\begin{vmatrix} 2 & a & abc \\ 2 & b & bca \\ 2 & c & cab \end{vmatrix}$$

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7. Use properties of determinants ot evaluate:

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

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

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9. Use properties of determinants ot evaluate:

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

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10. Use properties of determinants ot evaluate:

$$\begin{vmatrix} 2 & 3 & 5 \\ 261 & 592 & 127 \\ 20 & 30 & 50 \end{vmatrix}$$

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11. Show that $x = 1$ is a root of the equation:

$$\begin{vmatrix} x+1 & 2x & -11 \\ 2x & x+1 & -4 \\ -3 & 4x-7 & 6 \end{vmatrix} = 0$$

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12. If p,q,r ar in A.P. write the value of :

$$\begin{vmatrix} x+1 & x+2 & x+2p \\ x+2 & x+3 & x+2q \\ x+3 & x+4 & x+2r \end{vmatrix}$$

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13. Without expanding, prove that the following determinant vanishes.

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

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14. Without actual expansion, prove that the following determinants vanish:

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

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15. Without actual expansion, prove that the following determinants vanish:

$$\begin{vmatrix} 24 & 25 & 26 \\ 27 & 28 & 29 \\ 30 & 31 & 32 \end{vmatrix}$$

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16. Without actual expansion, prove that the following determinants vanish:

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

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17. Without actual expansion, prove that the following determinants vanish:

$$\begin{vmatrix} 1 & a & a^2-bc \\ 1 & b & b^2-ca \\ 1 & c & c^2-ab \end{vmatrix}$$

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18. Without actual expansion, prove that the following determinants vanish:

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

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19. 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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20. Without expanding, 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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21. Without expanding the determinant, show that : $\left(\frac{1}{a}+\frac{1}{b}+\frac{1}{c}+1\right)$ is a factor of : $\left|\begin{bmatrix}1+a & 1 & 1\\ 1 & 1+b & 1\\ 1 & 1 & 1+c\end{bmatrix}\right|$

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22. (x+y+z) is fator of :

$$\begin{vmatrix}x-y-z & 2x & 2x\\ 2y & y-z-x & 2y\\ 2z & 2z & z-x-y\end{vmatrix}$$

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23. 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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24. Evaluate the following:

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

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25. Evaluate $\begin{vmatrix} x+\lambda & x & x \\ x & x+\lambda & x \\ x & x & x+\lambda \end{vmatrix}$

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26. Evaluate the following:

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

Watch Video Solution

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

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

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29. Using the property of determinants and without expanding , prove that:

$|[b+c, q+r, y+z)], [c+a, r+p, z+x], [a+b, p+q, x+y]| = 2|[a, p,$

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30. Using the property of determinants and without expanding , prove that:

$$|[b+c, q+r, y+z)], [c+a, r+p, z+x], [a+b, p+q, x+y]| = 2|[a, p,$$

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31. Without expanding, prove the following

$$\begin{vmatrix} x+4 & x & x \\ x & x+4 & x \\ x & x & x+4 \end{vmatrix} = 16(3x+4)$$

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32. using properties of determinant, 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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33. Prove that:

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

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34. By using properties of determinants, show that :

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

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35. Prove that:

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

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36. Prove that:

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

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37. Prove that:

$$\begin{vmatrix} 1 & x & x^3 \\ 1 & y & y^3 \\ 1 & z & z^3 \end{vmatrix} = (x-y)(y-z)(z-x)(x+y+z)$$

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38. Prove that:

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

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39. Prove that:

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

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40. Prove that:

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

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41. Without expanding, prove the following

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

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42. Prove that:

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

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43. Prove that:

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

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44. Prove that

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

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45. Prove that:

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

Watch Video Solution

46. Prove that:

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

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47. 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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48. By using properties of determinants, show that :

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

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49. Without expanding, prove the following

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

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50. Without expanding, prove the following

$$\begin{vmatrix} x & x+y & x+2y \\ x+2y & x & x+y \\ x+y & x+2y & x \end{vmatrix} = 9y^2(x+y)$$

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51. Prove that $\begin{vmatrix} b+c & a & a \\ b & c+a & b \\ c & c & a+b \end{vmatrix}$ = 4 abc

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52. Prove that $\begin{vmatrix} 1 & x & x^2 - yz \\ 1 & y & y^2 - zx \\ 1 & z & z^2 - xy \end{vmatrix} = 0$

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53. Using properties of determinants, 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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54. Prove that :

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

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55. Show that: $\begin{vmatrix} x-y-z & 2x & 2x \\ 2y & y-z-x & 2y \\ 2z & 2z & z-x-y \end{vmatrix} = (x+y+z)^3$

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56. Show that: $\begin{vmatrix} a-b-c & 2a & 2a \\ 2b & b-c-a & 2b \\ 2c & 2c & c-a-b \end{vmatrix} = (a+b+c)^3$

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57. Using properties of determinants, prove that: $\begin{vmatrix} 3a & -a+b & -a+c \\ -b+a & 3b & -b+c \\ -c+a & -c+b & 3c \end{vmatrix} = 3(a+b+c)(ab+bc+ca)$

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58. Solve 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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59. Solve the equation $\begin{vmatrix} x-2 & 2x-3 & 3x-4 \\ x-4 & 2x-9 & 3x-16 \\ x-8 & 2x-27 & 3x-64 \end{vmatrix} = 0$

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

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61. Using properties of determinants, show that:
$\left|\begin{bmatrix} (b+c)^2 & a^2 & a^2 \\ b^2 & (c+a)^2 & b^2 \\ c^2 & c^2 & (a+b)^2 \end{bmatrix}\right| = 2abc(a+b+c)^3.$

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62. Prove that $\begin{vmatrix} (b+c)^2 & ab & ca \\ ab & (a+c)^2 & bc \\ ac & bc & (a+b)^2 \end{vmatrix} = 2abc(a+b+c)^3$

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

$\triangle = \begin{vmatrix} a & b & c \\ b & c & a \\ c & a & b \end{vmatrix}$ is negative.

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64. Without expanding show that following :

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

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65. 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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66. Prove that: $\begin{vmatrix} x+y & x & x \\ 5x+4y & 4x & 2x \\ 10x+8y & 8x & 3x \end{vmatrix} = x^3.$

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67. Prove that :

$\left|\left(a^2 a^2-(b-c)^2, bc\right), \left(b^2, b^2-(c-a)^2, ca\right), \left(c^2, c^2-(a-b)^2, ab\right)\right| = ($

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68. If p,q,r are not in G.P. and

$\begin{vmatrix} 1 & \frac{q}{p} & \alpha+\frac{q}{p} \\ 1 & \frac{r}{q} & \alpha+\frac{r}{q} \\ p\alpha+q & q\alpha+r & 0 \end{vmatrix} = 0$ then prove that $p\alpha^2+2q\alpha+r=0$

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69. Using determinant , find the area of triangle with verticles

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

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70. Using determinants find the area of triangle with vertices

(1,-1), (2,4),(-3,5)

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71. Find the area of the triangle with vertices at the points given in each of the following. Are the following point collinear? (0,0),(6,0),(4,3)

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72. Find area of the triangle with vertices at the point given in the following : $(2, 7), (1, 1), (10, 8)$

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73. Find area of the triangle with vertices at the point given in the following : $(-2, -3), (3, 2), (-1, -8)$

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74. Using determinants, show that the following points are collinear:

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

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75. Using determinants, show that the following points are collinear:

(-2,5),(-6,-7) and (-5,-4)

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76. If the point (3,-2),(x,2),(8,8) are collinear, find 'x' using determinants.

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77. if area of triangle is 35sq.unit with vertices (2,-6) (5,4) and (K,4) find K.

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78. Find the value of k' if the area of the triangle is 4 sq. units and vertices are (-2,0),(0,4) and (0, k).

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79. Determine the value of 'x' for which the area of the triangle formed by joining the points (x,4),(0,8) and (-1,-3) will be $4\frac{1}{2}$ square units.

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

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

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82. 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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83. Prove that area of the trianlge whose vertices are $\left(at_1^2, 2at_1\right), \left(at_2^2, 2at_2\right), \left(at_3^2, 2at_3\right)$ is $a^2(t_1 - t_2)(t_2 - t_3)(t_3 - t_1)$

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84. Prove that the $(a, b + c), (b, c + a)$ and $(c, a + b)$ are collinear.

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85. If the oints $(a_1b_1), (a_2b_2)$ and $(a_1 - a_2, b_1 - b_2)$ are collinear, then show that $a_1b_2 = a_2b_1$

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86. If (x,y) is any point on the line joining (a,0) and (0,b), show that $\frac{x}{a} + \frac{y}{b} = 1$

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87. An equilateral triangle has each side to a. If the coordinates of its vertices are $(x_1, y_1), (x_2, y_2)$ and (x_3, y_3) then the square of the determinat $\begin{vmatrix} x_1 & y_1 & 1 \\ x_2 & y_2 & 1 \\ x_3 & y_3 & 1 \end{vmatrix}^2$ equals

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88. If $\Delta = \begin{vmatrix} 1 & a \\ 1 & b \end{vmatrix}$, then minor of 'b' is ....

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89. Minor of 'd' in determinant $\begin{vmatrix} a & c \\ b & d \end{vmatrix}$ is..........

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90. Co-factor of 'y' in {:|(y,b),(z,c)|` is...........

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91. 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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92. Find all the co-factors of $\begin{vmatrix} 1 & 3 \\ -2 & 4 \end{vmatrix}$

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93. Write Minors and Cofactors of the elements of following determinant : $\begin{vmatrix} 2 & -4 \\ 0 & 3 \end{vmatrix}$

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94. Write Minors and Cofactors of the elements of following determinant : $\begin{vmatrix} a & c \\ b & d \end{vmatrix}$

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95. Write the co-factor of '7' in the determinant $\begin{vmatrix} 4 & 5 & 6 \\ 5 & 6 & 7 \\ 13 & 15 & 17 \end{vmatrix}$

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96. In the determinants $\begin{vmatrix} 5 & -1 & 4 \\ 2 & 3 & -5 \\ -1 & -2 & 6 \end{vmatrix}$, find the co-factors of the elements -5,3 and 6.

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97. Find the minor and co-factor of each element of the first column of the following determinants:

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

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98. Find the minor and co-factor of each element of the first column of the following determinants:

$$\begin{vmatrix} 0 & 2 & 6 \\ 1 & 5 & 0 \\ 3 & 7 & 1 \end{vmatrix}$$

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99. Find the minor and co-factor of each element of the first column of the following determinants:

$\begin{vmatrix} 1 & a & bc \\ a & b & ca \\ 1 & c & ab \end{vmatrix}$ Hence or otherwise evaluate them.

100. Write the minor and co-factor of each element of the following determinants and also evaluate the determinant in each case:

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

101. Write the minor and co-factor of each element of the following determinants and also evaluate the determinant :

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

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102. Write the minor and co-factor of each element of the following determinants and also evaluate the determinant in each case:

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

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103. Using Cofactors of elements of third column, evaluate

$$\triangle - \begin{vmatrix} 1 & x & yz \\ 1 & y & zx \\ 1 & z & xy \end{vmatrix}$$

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104. Evaluate the determinant :

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

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105. 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 $a_{11}A_{31} + a_{12}A32 + a_{13}A_{33} = 0$

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106. With the help of determinants, solve the following systems of equations:

: $3x + ay = 4, 2x + ay = 2, a \neq 0$

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107. With the help of determinants, solve the following systems of equations:

: $2x + 3y = 9, 3x - 2y = 7$

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108. With the help of determinants, solve the following systems of equations:

: $2x - y = -2, 3x + 4y + 8 = 0$

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109. With the help of determinants, solve the following systems of equations:

: $3x + y = 19, 3x - y = 23$

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110. Classify the following system of equations as consistenet or inconsistent. If consistent, solve them:

$x + y = -1, 2x - 3y = 8$

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111. Classify the following system of equations as consistenet or inconsistent. If consistent, solve them:

$3x-2y = 4, 6x-4y=10$

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112. Classify the following system of equations as consistenet or inconsistent. If consistent, solve them:

$x+2y = 5, 3x+6y=15$

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113. Use cramer's rule to show that the following systems of equations have infinite number of solutions:

$x+y+3z = 6, x-3y - 3z=4, 5x-3y + 3z = 8$

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114. Use cramer's rule to show that the following systems of equations have infinite number of solutions:

2x-3y-z=0,x+3y-2z=0,x-3y+3z=8

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115. Solve the following system of equations, using Cramer's rule: x+y+3z=6,x-3y-3z=-4,5x-3y+3z=8

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116. Show that the following systems of equations are inconsistent:

$$3x + y = 5$$
$$-6x - 2y = 9$$

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117. Show that the following systems of equations are inconsistent:

$$2x - y = 5$$
$$4x - 2y = 7$$

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118. Find a quadratic function defined by the equation: $f(x) = ax^2 + bx + c$ if f(1) =0,f(2)=-2and f(3)=-6

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119. Find a quadratic function defined by the equation: $f(x) = ax^2 + bx + c$ if f(0) = f(-1) = 0 and f(1)=2

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120. Find the value of λ for which the given system of equations: $\lambda x + y + z = 0, \ -x + \lambda y + z = 0, \ -x - y + \lambda z = 0$ will have a non-zero solution.

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121. Solve the following systems of equations by Cramer's Rule:

$2x+3y + 4z = 8, 3x+y-z=-2,4x-y-5z=-9$

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122. Solve the following systems of equations by Cramer's Rule:

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

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123. Solve the following systems of equations by Cramer's Rule:

$3x-4y + 5z=6,x+y-2z+1 = 0,2x+3y+z=0$

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124. Solve the following systems of equations by Cramer's Rule:

$(b+c) (y+z) -ax=b-c,(C+a)(z+x) -by = c-a,(a+b)(x+y)-cz=a-b$

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125. Classify the following system of equations as consistent or inconsistent. If consistent ,then solve them:

$x-y+3z=6, x+3y-3z=-4, 5x+3y+3z=14$

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126. Classify the following system of equations as consistent or inconsistent. If consistent ,then solve them:

$x-y+3z=6, x+3y-3z=-4, 5x+3y+3z=10$

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127. Classify the following system of equations as consistent or inconsistent. If consistent ,then solve them:

$2x+5y-z=9, 3x-3y+2z=7, 2x-4y+3z=1$

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128. Solve the following system of homogenous linear equations:

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

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129. Solve the following system of homogenous linear equations:

x+y-z=0,x-2y+z=0,3x+6y-5z=0

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130. Find the value of λ for whih the homogenous system of equations:

2x+3y - 2z = 0,2x-y+3z=9,7x+λy-z=0 has non-trivial solution.

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131. Find the cost of sugar and wheat per kg., if the cost of 7kg. Of sugar and 3 kg, of wheat is Rs. 210. cost of 7kg. wheat and 3 kg, of sugar is Rs.

160. (Use determinants).

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132. Find the cost of sugar and wheat per kg., if the cost of 7kg. Of sugar and 3 kg, of wheat is Rs. 210. cost of 7kg. wheat and 3 kg, of sugar is Rs. 160. (Use determinants).

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133. A square matrix A has inverse if and only if A is .... (Fill in the blanks)

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134. If A is a square matrix order 3 such that |adjA|=225, find |A'|.

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135. For what value of 'x', is the following matrix singular?

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

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136. For what value of x is the matrix $\begin{bmatrix} 5-x & x+1 \\ 2 & 4 \end{bmatrix}$ singular ?

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137. For what value of 'x', the matrix $\begin{bmatrix} 2-x & 3 \\ -5 & 1 \end{bmatrix}$ is not invertible?

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138. Find the adjoint of the following matrices:

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

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139. Find the adjoint of the following matrices:

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

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140. Find the adjoint of matrix $\begin{bmatrix} 2 & 3 \\ 1 & 4 \end{bmatrix}$

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141. Find the adjoint of the following matrices:

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

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142. If $A = \begin{pmatrix} 3 & 1 \\ 2 & -3 \end{pmatrix}$, then find |adj.A|

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143. If A is a square matrix of order 3 swuch that |A|=5, find |A.adj.A|.

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144. Write the inverse of the matrix:

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

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145. Write the inverse of the matrix:

`{:[(costheta, -sintheta),(sintheta,costheta)]

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146. Verify $A(adjA) = (adjA).\,A = |A|.\,I : \begin{bmatrix} 2 & 3 \\ -4 & -6 \end{bmatrix}$

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147. Verify $A(adjA) = (adjA).\,A = |A|.\,I : \begin{bmatrix} 1 & -1 & 2 \\ 3 & 0 & -2 \\ 1 & 0 & 3 \end{bmatrix}$

Watch Video Solution

148. If A = $\begin{bmatrix} \cos\theta & -\sin\theta & 0 \\ \sin\theta & \cos\theta & 0 \\ 0 & 0 & 1 \end{bmatrix}$ verify that A(adj A) =1

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149. Find the inverse of each of the following matrices:

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

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150. Find the inverse of each of the following matrices:

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

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151. If $A = \begin{bmatrix} 2 & -1 \\ -1 & 2 \end{bmatrix}$, verify $A^2 - 4A + 3I = O$, where $1 = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ and $O = \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$, Hence find A^{-1}

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

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153. Consider the matrix $A = \begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix}$ Show that $A^2 - 7A - 2I = O$

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154. Consider the matrix $A = \begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix}$ Hence , find A^{-1}

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155. If $A = \begin{bmatrix} 2 & 3 \\ 5 & -2 \end{bmatrix}$, write A^{-1} in terms of A.

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156. Verify that $(AB)^{-1} = B^{-1}A^{-1}$ for the matrices A and B where

$A = \begin{bmatrix} 2 & 3 \\ 1 & -4 \end{bmatrix} \text{ and } B = \begin{bmatrix} 1 & -2 \\ -1 & 3 \end{bmatrix}$

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157. Verify $(AB)^{-1} = B^{-1}A^{-1}$ for the matrices A and B. Where :

$A = \begin{bmatrix} 3 & 7 \\ 2 & 5 \end{bmatrix} \text{ and } B = \begin{bmatrix} 6 & 8 \\ 7 & 9 \end{bmatrix}$

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158. Verify that $(AB)^{-1} = B^{-1}A^{-1}$ for the matrices A and B where

$$A = \begin{bmatrix} 3 & 2 \\ 7 & 5 \end{bmatrix} \text{ and } B\begin{bmatrix} 6 & 7 \\ 8 & 9 \end{bmatrix}$$

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159. Verify $(AB)^{-1} = B^{-1}A^{-1}$ for the matrices A and B. Where :

$$A = \begin{bmatrix} 4 & 1 \\ 6 & 5 \end{bmatrix} \text{ and } B = \begin{bmatrix} 2 & 5 \\ 1 & 6 \end{bmatrix}$$

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160. Show that the matrix $A = [[2, 3], [1, 2]$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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161. If $A = \begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix}$, show that $A^2 - 5A + 7I = O$

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162. 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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163. If $A = \begin{bmatrix} 2 & -3 \\ -4 & 7 \end{bmatrix}$ compute A^{-1} and show that $2A^{-1} + A - 9I = 0$

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164. If $A = \begin{bmatrix} 6 & 7 \\ 8 & 9 \end{bmatrix}$ and $B = \begin{bmatrix} 3 & 2 \\ 7 & 5 \end{bmatrix}$, find $(AB)^{-1}$

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165. Find the inverse of each of the following:

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

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166. Find the inverse of each of the following:

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

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167. Find the inverse of each of the following:

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

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168. Find the inverse of each of the following:

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

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169. If $P = \begin{bmatrix} 1 & 2 & -2 \\ -1 & 3 & 0 \\ 0 & -2 & 1 \end{bmatrix}$, find P^{-1}. Verify that $PP^{-1} = I$.

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170. Compute $(AB)^{-1}$, where $A = \begin{bmatrix} 5 & 0 & 4 \\ 2 & 3 & 2 \\ 1 & 2 & 1 \end{bmatrix}$, $B^{-1} = \begin{bmatrix} 1 & 2 & 3 \\ 1 & 4 & 3 \\ 1 & 3 & 4 \end{bmatrix}$

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171. If $A = \begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & 2 \\ 2 & 2 & 1 \end{bmatrix}$, prove thst $A^2 - 4A - 5I = O$ and hence, obtain A^{-1}.

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172. 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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173. 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 $(AB)^{-1}$ I

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174. 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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175. 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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176. Find |A|:

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

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177. Verify $A(adjA) = (adjA).\,A = |A|.\,I : \begin{bmatrix} 1 & -1 & 2 \\ 3 & 0 & -2 \\ 1 & 0 & 3 \end{bmatrix}$

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178. Find |A|:

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

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179. Find the inverse of the matrix : $A = \begin{bmatrix} a & b \\ c & \frac{1+bc}{a} \end{bmatrix}$.

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180. Find the determinant of the matrix : $A = \begin{bmatrix} a & b \\ c & bc \end{bmatrix}$

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181. Find the determinant of the matrix : $A = \begin{bmatrix} a & b \\ c & \frac{1+bc}{a} \end{bmatrix}$

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182. Find the inverse of the matrix : $A = \begin{bmatrix} a & b \\ c & \frac{1+bc}{a} \end{bmatrix}.$

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183. Find the inverse of the matrix : A = $\begin{bmatrix} \cos\theta & \sin\theta \\ -\sin\theta & \cos\theta \end{bmatrix}$

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184. Find the transpose of the matrix : $A = \begin{bmatrix} a & b \\ c & \frac{1+bc}{a} \end{bmatrix}$

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185. Find the inverse of the matrix : $\begin{bmatrix} 2/13 & -5/3 \\ 3/13 & -1/13 \end{bmatrix}$

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186. Find the inverse of the matrix : $\begin{bmatrix} \frac{3}{14} & \frac{1}{7} \\ -\frac{2}{7} & \frac{1}{7} \end{bmatrix}$

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187. Find the inverse of the matrix : $A = \begin{bmatrix} a & b \\ c & \frac{1+bc}{a} \end{bmatrix}$ and show that : $\begin{bmatrix} \frac{1}{3} & -\frac{2}{3} \\ -\frac{2}{3} & 1 \end{bmatrix}$

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188. Find the inverse of the matrix : $A = \begin{bmatrix} a & b \\ c & \frac{1+bc}{a} \end{bmatrix}$ and show that : $\frac{1}{7}\begin{bmatrix} 2 & -1 \\ 1 & 3 \end{bmatrix}$

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189. Find the inverse of the matrix : $A = \begin{bmatrix} a & b \\ c & \frac{1+bc}{a} \end{bmatrix}$ and show that :

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

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190. Find the inverse of the matrix : $A = \begin{bmatrix} a & b \\ c & \frac{1+bc}{a} \end{bmatrix}$ and show that :

$A^{-1} = \frac{1}{19} A$

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191. By using elementary transformation find the inverse of the matrix :

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

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192. Find the inverse of the matrix : $A = \begin{bmatrix} a & b \\ c & \frac{1+bc}{a} \end{bmatrix}$ and show that :

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

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193. Find the inverse of the matrix : $\begin{bmatrix} 1 & -2 \\ -1 & 3 \end{bmatrix}$

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194. Find the inverse of the matrix : $A = \begin{bmatrix} a & b \\ c & \frac{1+bc}{a} \end{bmatrix}$ and show that :

$\begin{bmatrix} -61/2 & 47/2 \\ 87/2 & -67/2 \end{bmatrix}$

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195. Find the transpose of the matrix : $\begin{bmatrix} -2 & 0 & 1 \\ 9 & 2 & -3 \\ 6 & 1 & -2 \end{bmatrix}$

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196. Find the inverse of the matrix : $\begin{bmatrix}1 & -1 \\ 0 & 1/2\end{bmatrix}$

Watch Video Solution

197. Find the inverse of the matrix : $A = \begin{bmatrix}a & b \\ c & \frac{1+bc}{a}\end{bmatrix}$.

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198. Find the transpose of the matrix : $\begin{bmatrix}1 & 0 & 0 \\ -1 & 1/3 & 0 \\ 3 & 2/3 & -1\end{bmatrix}$

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199. Find the inverse of the matrix : $\begin{bmatrix}-2 & 20 \\ -2 & 18\end{bmatrix}$

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200. Find the transpose of the matrix : $\begin{bmatrix} -\frac{3}{5} & \frac{2}{5} & \frac{2}{5} \\ \frac{2}{5} & -\frac{3}{5} & \frac{2}{5} \\ \frac{2}{5} & \frac{2}{5} & -\frac{3}{5} \end{bmatrix}$

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201. Find the inverse of the matrix : $A = \begin{bmatrix} a & b \\ c & \frac{1+bc}{a} \end{bmatrix}$.

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202. Find the inverse of the matrix : $A = \begin{bmatrix} a & b \\ c & \frac{1+bc}{a} \end{bmatrix}$.

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203. Classify the following systems of equations as consistent or inconsistent:

$x + 2y = 2$

$2x + 3y = 3$

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204. Classify the following systems of equations as consistent or inconsistent:

$$2x - y = 5$$
$$x + y = 4$$

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205. Classify the following systems of equations as consistent or inconsistent:

$$x + 3y = 5$$
$$2x + 6y = 8$$

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206. Solve the following eqations, using inverse of a matrix:

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

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207. Solve the following eqations, using inverse of a matrix:

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

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208. Solve the following eqations, using inverse of a matrix:

$2x + 3y = 4$
$4x + 5y = 6$

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209. Solve the following eqations, using inverse of a matrix:

$2x + 5y = 1$
$3x + 2y = 7$

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210. Solve the following eqations, using inverse of a matrix:

$5x + 2y = 4$

$7x + 3y = 5$

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211. Solve system of linear equations, using matrix method:

$4x - 3y = 3, 3x - 5y = 7$

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212. Solve the following eqations, using inverse of a matrix:

$x + y = 5$

$y + z = 3$

$z + x = 4$

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213. Classify the following system of equations as consistent or inconsistent:

$x + y + z = 1$

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

$ax + ay + 2ax = 4$

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214. Classify the following system of equations as consistent or inconsistent:

$3x - y - 2z = 2$

$2y - z = -1$

$3x - 5y = 3$

Watch Video Solution

215. Classify the following system of equations as consistent or inconsistent:

$5x - y + 4z = 5$

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

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

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216. Classify the following system of equations as consistent or inconsistent:

$$5x - 6y + 4z = 15$$
$$7x + 4y - 3z = 19$$
$$2x + y + 6z = 46$$

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217. Using matrices, solve the following system of equations for x,y and z:

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

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218. Solve the following system of linear equations by matrix method: $x - y + z = 4, 2x + y - 3z = 0, x + y + z = 2$

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219. Using matrices, solve the following system of equations for x,y and z:

$x + 2y + z = 7$

$x + 3z = 11$

$2x - 3y = 1$

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220. Using matrices, solve the following system of equations for x,y and z:

$x + 2y + z = 8$

$2x + y - z = 1$

$x - y + z = 2$

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221. Using matrices, solve the following system of equations for x,y and z:

$x + y - z = 3$

$2x + 3y + z = 10$

$3x - y - 7z = 1$

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222. Using matrices, solve the following system of equations for x,y and z:

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

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223. Using matrices, solve the following system of equations for x,y and z:

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

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224. Using matrices, solve the following system of equations for x,y and z:

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

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225. Using matrices, solve the following system of equations for x,y and z:

$3x-2y+3z=8, 2x+y-z=1, 4x-3y+2z=4$

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226. Using matrices, solve the following system of equations for x,y and z:

2x+y+z=1,x-2y-z=3/2,3y-5z=9`

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227. Solve the following equations, using inverse of a matrix:

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

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228. Solve the following equations, using inverse of a matrix:

$$x + 2y = 5$$
$$y + 2z = 8$$
$$z + 2x = 5$$

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229. Solve the following system of linear equations by matrix method:

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

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230. Solve the following equations, using inverse of a matrix:

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

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231. Solve the following equations, using inverse of a matrix:

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

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232. Solve by using matrix method,

$2x - 3y + 5z = 16, 3x + 2y - 4z = -4, x + y - 2z = -3$

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233. Solve the following equations, using inverse of a matrix:

$2x + y + z = 1$
$2x - 4y - 2z = 3$
$3y - 5z = 9$

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234. Solve by matrix method $2x + 3y + 3z = 5$ $x - 2y + z = -4$

$3x - y - 2z = 3$

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235. Solve the following equations, using inverse of a matrix:

$3x + 4y + 7z = 4$
$2x - y + 3z = -3$
$x + 2y - 3z = 8$

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236. Solve the following equations, using inverse of a matrix:

$8x + 4y + 3z = 18$

$2x + y + z = 5$

$x + 2y + z = 5$

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237. Solve the following equations, using inverse of a matrix:

$x + y + z = 6$

$y + 3z = 11$

$x - 2y + z = 0$

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

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

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239. Find A^{-1}, $A = \begin{bmatrix} 1 & 2 & -3 \\ 2 & 3 & 2 \\ 3 & -3 & -4 \end{bmatrix}$ Hence, solve the following system of linear equations:

x+2y-3z=-4,2x+3y+2z=2, 3x-3y-4z=11.

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

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241. Given that $A = \begin{bmatrix} -4 & 4 & 4 \\ -7 & 1 & 3 \\ 5 & -3 & -1 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & -1 & 1 \\ 1 & -2 & -2 \\ 2 & 1 & 3 \end{bmatrix}$. Find AB. Use this to solve the following system of equations:

x-y+z=4,x-2y-2z=9,2x+y+3z=1.

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242. 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

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243. Solve the following systems of homogenous equations:

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

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244. Solve the following systems of homogenous equations:

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

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245. Solve the following systems of homogenous equations:

$x + 2y - 2z = 0$
$4x + y - 3z = 0$
$5x - 4y - 9z = 0$

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246. Solve the following systems of homogenous equations:

$x + y - z = 0$
$3x - 2y + 4z = 0$
$5x + 6y - 5z = 0$

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247. 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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248. The sum of three numbers-is 6. If we multiply the third number by 2 and add the first number to the result, use get 7. By adding second and third number to three times the first number, we get 12. Using matrices, find the numbers.

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

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250. Find area of the triangle with vertices at the point given in the following : $(1, 0), (6, 0), (4, 3)$

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251. Show that $\Delta = \begin{vmatrix} x & p & q \\ p & x & q \\ q & q & x \end{vmatrix} = (x-p)(x^2+px-2q^2)$

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252. If $\Delta = \begin{vmatrix} 0 & b-a & c-a \\ a-b & 0 & c-b \\ a-c & b-c & 0 \end{vmatrix}$, then show that Δ is equal to zero.

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253. If x = -4 is a root of $\Delta = \begin{vmatrix} x & 2 & 3 \\ 1 & x & 1 \\ 3 & 2 & x \end{vmatrix} = 0$, then find the other two roots.

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254. Show that the points (a+5,a-4),(a-1,a+3) and (a,a) do not lie on a straight line for any value of a.

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255. If $A = \begin{bmatrix} 3 & 1 \\ 7 & 5 \end{bmatrix}$, find x and y so that $A^2 + xI - yA$=0. Hence find A^{-1}

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256. Without expanding, show that the following determinants vanish:

$|(1, \cos(\beta - \alpha), \cos(\gamma - \alpha)), (\cos(\alpha - \beta), 1, \cos(\gamma - \beta)), (\cos(\alpha - \gamma)), \text{co}$

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257. Prove that:

$$\begin{vmatrix} a+b+nc & na-a & nb-b \\ nc-c & b+c+na & nb-b \\ nc-c & na-a & c+a+nb \end{vmatrix} = n(a+b+c)^3$$

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

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259. If $\left|\begin{bmatrix} x & 2 \\ 18 & x \end{bmatrix}\right| = \left|\begin{bmatrix} 6 & 2 \\ 18 & 6 \end{bmatrix}\right|$, then x is equal to:

A. 6

B. ± 6

C. -6

D. 6,6

Answer:

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260. Let A be a square matrix of order 3×3. Then I kA I is equal to :

A. K|A|

B. $k^2|A|$

C. $k^3|A|$

D. 3k|A|

Answer:

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261. 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:

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262. If area of triangle is 35 sq. units with vertices (2,-6), (5, 4) and (k,4) then k is :

A. 12

B. -2

C. $-12, \ -2$

D. $12, \ -2$

Answer:

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263. Let A be a non-singular matrix of order 3×3. Then I adj. A I is equal to :`

A. |A|

B. $|A|^2$

C. $|A|^3$

D. 3|A|

Answer:

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264. Select the Correct Option 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:

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265. 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:

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

A. Det(A)=0

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

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

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

Answer:

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267. If $\begin{vmatrix} 2x & 5 \\ 8 & x \end{vmatrix} = \begin{vmatrix} 6 & -2 \\ 7 & 3 \end{vmatrix}$, write the value of x.

A. 3

B. ± 3

C. ± 6

D. 6

Answer:

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268. The area of a triangle with vertices (-3,0),(3,0) and (0,k) is 9 sq. units. The value of 'k' will be

A. 9

B. 3

C. -9

D. 6

Answer:

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269. 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:

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270. If determinant A is of order 2×2 and |A|=3, then the value of |2A| is

A. 6

B. 12

C. -6

D. None of these

Answer:

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271. Write the value $\begin{vmatrix} x & x+1 \\ x-1 & x \end{vmatrix}$

A. 1

B. x

C. x^2

D. 0

Answer:

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272. If matric $A = \begin{vmatrix} 3-2x & x+1 \\ 2 & 4 \end{vmatrix}$ is singular, then x is equal to

A. 0

B. 1

C. -1

D. -2

Answer:

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273. The value of x from the equation $\begin{vmatrix} x & 2 & 3 \\ 4 & x & 1 \\ x & 2 & 5 \end{vmatrix} = 0$ is

A. $\pm\sqrt{2}$

B. $\pm\sqrt{3}$

C. $\pm 2\sqrt{2}$

D. $\pm 2\sqrt{3}$

Answer:

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274. If A is a square matrix of order 3 such that |adjA|=16, then |A| is

A. 3

B. 4

C. 0

D. 1

Answer:

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275. If $\begin{vmatrix} 2 & 3 \\ 4 & 5 \end{vmatrix} = \begin{vmatrix} x & 3 \\ 2x & 5 \end{vmatrix}$, then the value of 'x' is ....

A. 3

B. 4

C. 2

D. None of these

Answer:

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276. The cofactor of a_{13} in $\begin{vmatrix} 2 & -3 & 5 \\ 6 & 0 & 4 \\ 1 & 5 & -7 \end{vmatrix}$ is

A. 30

B. 46

C. -42

D. 40

Answer:

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277. If A= diag (4, 2, 1) then det. A is equal to :

A. 0

B. 7

C. 8

D. None of these

Answer:

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278. 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:

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279. If $a_1, a_2, a_3, \ldots\ldots\ldots\ldots\ldots\ldots$ are in A.P., then the value of:

$\begin{vmatrix} a_1 & a_2 & 1 \\ a_2 & a_3 & 1 \\ a_3 & a_4 & 1 \end{vmatrix}$ is equal to

A. $a_4 - a_1$

B. $\dfrac{a_1 + a_4}{2}$

C. 0

D. $\frac{a_2 + a_3}{2}$

Answer:

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280. The system of linear equations:

3x+y-z=2,x-z=1 and 2x+2y+az=5 has unique solution, when

A. $a \neq 3$

B. $a \neq 4$

C. $a \neq 1$

D. $a \neq 2$

Answer:

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281. Let I denote the 3×3 and P be a matrix obtained by rearranging the columns of I. Then

A. 1) there are six distinct choices for P and det (P) = 1

B. 2) there are six distinct choices for P and det(P)=± 1

C. 3) there are more than one choices for P and some of them are not invertible.

D. 4) there are more than one choices for P and P^{-1} = I in each choice.

Answer:

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282. If A is matrix of order 3,such that A(adjA)=10I. Then |adjA|=

A. 1

B. 10

C. 100

D. 101

Answer:

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283. Without expanding the determinant at any stage, prove that $\begin{vmatrix} x+1 & x+2 & x+a \\ x+2 & x+3 & x+b \\ x+3 & x+4 & x+e \end{vmatrix} = 0$ Where a,b,c are in A.P.

A. 0

B. x-(a+b+c)

C. a+b+c

D. $9x^2 + a + b + c$

Answer:

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284. Consider the following statements: (i) If any two rows or coluns of a determinant are identical, then the value of the determinatn is zero. (ii) If the corresponding rows and columns of a determinant are interchanged, then the value of the determinant does not change. (iii) If any two rows (or columns) of a determinant are interchanged, then the value of the determinant changes in sign. Which of these are correct?

A. (i) and (iii)

B. (i) and (ii)

C. (i),(ii) and (iii)

D. (ii) and (iii)

Answer:

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285. Let A be a square matrix all of whose entries are integers.

Which one of the following it true?

A. If $\det A = \pm 1$, then A^{-1} need not exist

B. If $\det A = \pm 1$, then A^{-1} exist but all entries are not necessarily integers.

C. If $\det A \neq \pm 1, then A^{-1}$ exists and all its entries are non-integers

D. If $\det A = \pm 1$, then A^{-1} exists and all its entries are integers.

Answer:

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286. Let $\omega \neq 1$ be a cube root of unity and S be the set of all non-singular matrices of the form $\begin{bmatrix} 1 & a & b \\ \omega & 1 & c \\ \omega^2 & \omega & 1 \end{bmatrix}$, where each of a, b, and c is either ω or ω^2. The number of distinct matrices in the sat S is

A. 2

B. 6

C. 4

D. 8

Answer:

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287. Let M and N be two 3×3 non-singular skew-=symmetric matrices such that $MN = NM$. If P^T denotes the transpose of P, then $M^2N^2(M^TN)^{-1}(MN^{-1})^T$ is equal to

A. M^2

B. $-N^2$

C. $-m^2$

D. MN

Answer:

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288. The number of values of k which the linear equations

4x+ky+2z=0

kx+4y+z=0

2x+2y+z=0

Possess a non-zero solution is

A. 3

B. 2

C. 1

D. zero

Answer:

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289. The number of values of k, for which the system of equations $(k+1)x+8y=4k\ kx+(k+3)y=3k-1$ has no solution, is

A. 1

B. 2

C. 3

D. infinite

Answer:

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290. If $P = \begin{bmatrix} 1 & \alpha & 3 \\ 1 & 3 & 3 \\ 2 & 4 & 4 \end{bmatrix}$ is the adjoint of a 3×3 matrix A and $|A| = 4,$ then α is equal to

A. 11

B. 5

C. 0

D. 4

Answer:

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291. If $\begin{vmatrix} x & x \\ 1 & x \end{vmatrix} = \begin{vmatrix} 3 & 4 \\ 1 & 2 \end{vmatrix}$. Write the positive value of 'x'.

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292. If A is a square matrix of order 3 and |3A| = k|A|, then write the value of 'k'.

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293. If A is a square matrix order 3 such that |adjA|=225, find |A'|.

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294. Prove that: $\begin{vmatrix} a+b+2c & a & b \\ c & b+c+2a & b \\ c & a & c+a+2b \end{vmatrix} = 2(a+b+c)^3$

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295. Using the properties of determinant, show 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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296. Using Cofactors of elements of third column, evaluate $\triangle - \begin{vmatrix} 1 & x & yz \\ 1 & y & zx \\ 1 & z & xy \end{vmatrix}$

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297. Find the value of k’ if the area of the triangle is 4 sq. units and vertices are (-2,0),(0,4) and (0, k).

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298. Find the inverse of the matrix $A = \begin{bmatrix} a & b \\ c & \frac{1+bc}{a} \end{bmatrix}$ and show that : $aA^{-1} = (a^2 + bc + 1)I - aA$

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299. Without expanding show that following :

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

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300. 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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301. Let $P = \begin{bmatrix} 3 & -1 & -2 \\ 2 & 0 & \alpha \\ 3 & -5 & 0 \end{bmatrix}$, where $\alpha \in R$. Suppose $Q = [q_{ij}]$ is a matrix such that $PQ = KI$, where $k \in R, k \neq 0$ and I is the identity matrix of order 3. If

$q_{23} = -\frac{k}{8}$ and $\det.(Q) = \frac{k^2}{2}$, then

A. $\alpha = 0, k = 8$

B. $4\alpha - k + 8 = 0$

C. $\det(Padj(Q)) = 2^9$

D. $\det(Qadj(P)) = 2^{13}$

Answer:

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302. Let M be a 2×2 symmetric matrix with integer entries.

Then , M is invertible, if

A. the first column of M is the tranpose of the second row of M

B. the second row of M is the transpose of the first column of M

C. M is a diagonal matrix with non-zero entries in the main diagonal

D. the product of entries in the main diagonal of M is not the square of an integer.

Answer:

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303. Let M and n be two 3×3 matrices such that $MN = NM$.

Further, If $M \neq N^2 \text{ and } M^2 = N^4$, then

A. determinant of $\left(M^2 = N^4\right)$ is 0

B. there is a 3×3 non-zero matrix U such that:

$\left(M^2 + MN^2\right)$ U is the zero matrix.

C. determined of $\left(M^2 + MN^2\right) \geq 1$

D. for a 3×3 matrix U, if $\left(M^2 + MN^2\right)$ U equals the zero matrix, then U is the zero matrix.

Answer:

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304. For 3×3 martrices M and N, which of the following statement (s) is (are) not correct?

A. $N^T MN$ is symmetric or skew-symmetric, according as M is symmetric or skew-symmetric

B. MN-NM is skew-symmetric for all symmetric matrices M and N

C. MN is symmetric for all symmetric matrices M and N

D. (Adj M) (Adj N) = adj (MN) for all invertible matrices M and N.

Answer:

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305. If the adjoint of a 3x3 matrix P is (1 4 4) (2 1 7) (1 1 3) , then the possible value(s) of the determinant of P is (are)

A. 1

B. -2

C. 2

D. 1

Answer:

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306. If A is a matrix of order $m \times m$ such that

$A^2 + A + 2I = O$, then

A. A is non-singular

B. A is symmetric

C. $|A| \neq 0$

D. $A^{-1} = -\frac{1}{2}(A + I)$

Answer:

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307. Let a, b, and c be three real numbers satisfying

$$[a \quad b \quad c]\begin{bmatrix} 1 & 9 & 7 \\ 8 & 2 & 7 \\ 7 & 3 & 7 \end{bmatrix} = [0 \quad 0 \quad 0] \qquad ...(E)$$

If the point $P(a, b, c)$, with reference to €, lies on

the plane $2x + y + z = 1$, then the value of $7a + b + c$

is

A. 0

B. 12

C. 7

D. 6

Answer:

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308. Let ω be a solution of $z^3 - 1 = 0$ If a = 2 , b=8 and c =7 then the value of $\frac{3}{\omega^a} + \frac{3}{\omega^b} + \frac{3}{\omega^c}$ is equal to

A. -2

B. 2

C. 3

D. -3

Answer:

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309. If $A = \begin{pmatrix} 1 & 0 & 0 \\ 2 & 1 & 0 \\ 3 & 2 & 1 \end{pmatrix}$, $U_1, U_2,$ and U_3 are column matrices satisfying $AU_1 = \begin{pmatrix} 1 \\ 0 \\ 0 \end{pmatrix}$, $AU_2 = \begin{pmatrix} 2 \\ 3 \\ 0 \end{pmatrix}$ and $AU_3 = \begin{pmatrix} 2 \\ 3 \\ 1 \end{pmatrix}$ and

U is 3×3 matrix when columns are U_1, U_2, U_3 then

answer the following questions

The sum of the elements of U^{-1} is

A. -1

B. 0

C. 1

D. 3

Answer:

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310. A complex number U = 4+2i.The value of |U| is

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311. Let A be the set of all 3× 3 symmetric matrices all of whose either 0 or 1. Five of these entries are 1 and four of them are 0.The number of matrices A in A for which the system of linear equation $A\begin{bmatrix}x\\y\\z\end{bmatrix}=\begin{bmatrix}1\\0\\0\end{bmatrix}$ has a unique solution is

A. less than 4

B. at least 4 but less than 7

C. at least 7 but less than 10

D. at least 20

Answer:

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312. Let A be the set of all 3×3 symmetric matrices all of whoes entries are either 0 or 1. Five of these entries are 1 and four of them are 0.

The number of matrices A for which the system of linear equations $A\begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 1 \\ 0 \\ 0 \end{bmatrix}$ has a unique solution, is

A. 0

B. more than 2

C. 2

D. 1

Answer:

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313. For a 2×2 matrix, A = $[a_{ij}]$, whose elements are given by $a_{ij} = \frac{i}{j}$, write the value of a_{12}

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314. If A is a square matrix such that $A^2 = A$, then write the value of $(I + A)^2 - 3A$

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315. Evaluate the following determinants:

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

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316. If $\Delta = \begin{vmatrix} 1 & 2 & 3 \\ 2 & 0 & 1 \\ 5 & 3 & 8 \end{vmatrix}$, write the minor of the element a_{21}

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

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318. If $A = \begin{bmatrix} \cos\theta & \sin\theta \\ -\sin\theta & \cos\theta \end{bmatrix}$ then prove that $A^n = \begin{bmatrix} \cos n\theta & \sin n\theta \\ -\sin n\theta & \cos n\theta \end{bmatrix}, n \in N$

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319. If $A = \begin{bmatrix} \cos\alpha & \sin\alpha \\ -\sin\alpha & \cos\alpha \end{bmatrix}$, A'A=I.

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320. Using elementary transformations find the inverse of $\begin{bmatrix} 2 & 0 & -1 \\ 5 & 1 & 0 \\ 0 & 1 & 3 \end{bmatrix}$

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321. Using properties of determinants, prove that 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 $1 + xyz = 0$.

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322. If $A = \begin{bmatrix} 1 & 2 & 3 \\ 0 & -1 & 4 \\ 3 & 2 & 1 \end{bmatrix}$, find $(A')^{-1}$

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323. Solve by matrix method

$$\frac{2}{x} + \frac{3}{y} + \frac{10}{z} = 4,\ \frac{4}{x} - \frac{6}{y} + \frac{5}{z} = 1,\ \frac{6}{x} + \frac{9}{y} - \frac{20}{z} = 2,\ x, y, z \neq 0$$

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324. Let $A = \begin{bmatrix} 0 & 1 \\ 0 & 0 \end{bmatrix}$, show that $(aI + bA)^n = a^n I + na^{n-1} bA$, where I is the identity matrix of order 2 and$n \in N$

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325. Using properties of determinants, show that:
$$\left|\begin{bmatrix}(b+c)^2 & a^2 & a^2\\ b^2 & (c+a)^2 & b^2\\ c^2 & c^2 & (a+b)^2\end{bmatrix}\right| = 2abc(a+b+c)^3.$$

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

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