MATHS

BOOKS - OMEGA PUBLICATION

DETERMINANTS

Questions

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

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

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3. If $A = \begin{bmatrix} 1 & 1 & -2 \\ 2 & 1 & -3 \\ 5 & 3 & -9 \end{bmatrix}$, find $|A|$.

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

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6. If $\begin{vmatrix} x+2 & 3 \\ x+5 & 4 \end{vmatrix} = 3$, then find the value of x.

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7. Find the value of x from the following $\begin{vmatrix} x & 4 \\ 2 & 2x \end{vmatrix} = 0$

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

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9. 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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10. Without expanding, prove the following

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

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11. 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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12. 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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13. 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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14. 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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15. 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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16. 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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17. Examine the consistency of the system of equations :

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

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18. 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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19. 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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20. Using properties of determinant prove that

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

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21. 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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22. 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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23. Using properties of determinants, prove the following:

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

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24. 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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25. Using properties of determinants $\begin{vmatrix} x & y & x+y \\ y & x+y & x \\ x+y & x & y \end{vmatrix}$.

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26. 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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27. Using properties of determinant, prove that

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

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28. Using properties of determinants, prove that

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

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29. Using properties of determinants, prove the following

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

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30. using properties of determinants, solve the following for x:

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

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31. Find the area of the triangle with vertices $(2, 7), (1, 1)$ and $(10, 8)$.

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32. Find the area of the triangle with vertices $(-2, -3), (3, 2)$ and $(-1, -8)$.

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

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

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36. Show that the points $(1, 0), 6, 0), (0, 0)$ are collinear.

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

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38. 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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39. 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 $a_{11}C_{31} + a_{12}C_{32} + a_{13}C_{33} = 0.$

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

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41. Find the inverse of $\begin{bmatrix} 1 & 0 & 0 \\ 3 & 3 & 0 \\ 5 & 2 & -1 \end{bmatrix}$.

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42. Find the inverse of $\begin{bmatrix} 2 & 1 & 3 \\ 4 & -1 & 0 \\ -7 & 2 & 1 \end{bmatrix}$.

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

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44. 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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45. 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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46. Solve the following system of linear equations by matrix method :

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

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

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

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

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

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

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

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52. 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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53. Using matrices, solve the following system of equations

$x + y + z = 6$

$x + 2z = 7$

$3x + y + z = 12$

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

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

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55. Examine the consistency of the system of equations :

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

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56. 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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62. If $\begin{vmatrix} x+2 & 3 \\ x+5 & 4 \end{vmatrix} = 3$, then find the value of x.

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63. Find the value of x from the following $\begin{vmatrix} x & 4 \\ 2 & 2x \end{vmatrix} = 0$

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

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65. 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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66. Without expanding, prove the following

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

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67. 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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68. 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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69. 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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70. 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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71. Prove that $\begin{vmatrix} 1+a & 1 & 1 \\ 1 & 1+b & 1 \\ 1 & 1 & 1+c \end{vmatrix}$ =abc $\left(1 + \frac{1}{a} + \frac{1}{b} + \frac{1}{c}\right)$

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72. Solve the system of the following equations :

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

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73. Examine the consistency of the system of equations :

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

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74. 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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75. 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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76. Using properties of determinant prove that

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

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77. 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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78. 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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79. Using properties of determinants, prove the following: $\begin{vmatrix} a+b+2c & a & b \\ c & b+c+2a & b \\ c & a & c+a+2b \end{vmatrix} = 2(a+b+c)^3$.

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80. 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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81. Using properties of determinants $\begin{vmatrix} x & y & x+y \\ y & x+y & x \\ x+y & x & y \end{vmatrix}$.

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82. 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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83. Using properties of determinant, prove that

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

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84. Using properties of determinants, prove that

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

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85. Using properties of determinants, prove the following

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

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86. using properties of determinants, solve the following for x:

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

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87. Find the area of the triangle with vertices $(2, 7), (1, 1)$ and $(10, 8)$

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88. Find the area of the triangle with vertices $(-2, -3), (3, 2)$ and $(-1, -8)$.

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

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

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

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96. Find the adjoint of the following matrices:

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

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97. Find the inverse of $\begin{bmatrix} 1 & 0 & 0 \\ 3 & 3 & 0 \\ 5 & 2 & -1 \end{bmatrix}$.

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98. Find the inverse of $\begin{bmatrix} 2 & 1 & 3 \\ 4 & -1 & 0 \\ -7 & 2 & 1 \end{bmatrix}$.

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

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

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

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

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

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$2x + y + z = 1$

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

$3y - 5z = 9$

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

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

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108. Using Matrix method, solve the following system of equations:

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

$x - 2y + z = 4$

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

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$x + y + z = 1, 2x + 3y + 2z = 2 \text{ and } ax + ay + 2az = 4.$

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Important Questions From Miscellaneous Exercise

1. 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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2. 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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3. 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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4. Using matrices, solve the following system of linear equations :

$2x - y + z = 3$

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

$x - y + 2x = 1.$

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5. 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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6. Using properties of determinants, prove that:

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

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7. 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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8. 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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9. 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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10. 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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11. Using matrices, solve the following system of linear equations :

$2x - y + z = 3$

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

$x - y + 2x = 1.$

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12. 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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13. Using properties of determinants, prove that:
$$\begin{vmatrix} \sin\alpha & \cos\alpha & \cos(\alpha+\delta) \\ \sin\beta & \cos\beta & \cos(\beta+\delta) \\ \sin\gamma & \cos\gamma & \cos(\gamma+\delta) \end{vmatrix} = 0$$

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14. Solve the following system of equations $\frac{2}{x} + \frac{3}{y} + \frac{10}{z} = 4, \frac{4}{x} - \frac{6}{y} + \frac{5}{z} = 1, \frac{6}{x} + \frac{9}{y} - \frac{20}{z} = 2.$

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Multiple Choice Questions Mcqs

1. 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: B

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2. 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: C

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3. If A is an invertible matrix of order n, then $|adjA| =$

A. $|A|^n$

B. $|A|^{n+1}$

C. $|A|^{n-1}$

D. $|A|^{n+2}$

Answer: C

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

A. 12

B. -2

C. $-12, \ -2$

D. $12, \ -2$

Answer: D

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

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

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

C. $a_{21}A_{11} + a_{22}A_{12} + a_{23}A_{13}$

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

Answer: D

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6. 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: B

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7. Select the Correct Option If A is an invertible matrix of order 2, then det(A^-1) is equal to

A. $|A|$

B. $\frac{1}{|A|}$

C. 1

D. 0

Answer: B

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8. If a, b, c are in A.P., then the determinant $\begin{vmatrix} x+2 & x+3 & x+2a \\ x+3 & x+4 & x+2b \\ x+4 & x+5 & x+2c \end{vmatrix}$ is

A. 0

B. 1

C. x

D. $2x$

Answer: A

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

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

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

C. $\frac{1}{xyz}\begin{bmatrix} x & 0 & 0 \\ 0 & y & 0 \\ 0 & 0 & z \end{bmatrix}$

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

Answer: A

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10. 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. $|A| = 0$

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

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

D. $|A| \in [2, 4]$

Answer: D

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11. 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: B

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12. 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: C

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13. If A is an invertible matrix of order n, then $|adjA| =$

A. $|A|^n$

B. $|A|^{n+1}$

C. $|A|^{n-1}$

D. $|A|^{n+2}$

Answer: C

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

A. 12

B. -2

C. $-12, \ -2$

D. $12, \ -2$

Answer: D

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

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

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

C. $a_{21}A_{11} + a_{22}A_{12} + a_{23}A_{13}$

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

Answer: D

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16. 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: B

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17. If A is an invertible matrix of order 2, then $\left|A^{-1}\right|$ is equal to

A. $|A|$

B. $\frac{1}{|A|}$

C. 1

D. 0

Answer: B

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18. If a, b, c, are in A.P, then the determinant $\begin{vmatrix} x+2 & x+3 & x+2a \\ x+3 & x+4 & x+2b \\ x+4 & x+5 & x+2c \end{vmatrix}$ is:

A. 0

B. 1

C. x

D. $2x$

Answer: A

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19. If x. y, z are non- real number", then the inverse of matrix

$$A = \begin{bmatrix} x & 0 & 0 \\ 0 & y & 0 \\ 0 & 0 & z \end{bmatrix}$$ is

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

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

C. $\frac{1}{xyz}\begin{bmatrix} x & 0 & 0 \\ 0 & y & 0 \\ 0 & 0 & z \end{bmatrix}$

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

Answer: A

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

A. $|A|=0$

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

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

D. $|A|\in[2,4]$

Answer: D

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