MATHS

BOOKS - ARIHANT PUBLICATION

DETERMINANTS

Sample Questions

1. Evaluate the following determinant

$|-12|$

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2. Evaluate the following determinant

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

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3. Evaluate the following determinant

$$\begin{vmatrix} x-1 & 1 \\ x^3 & x^2+x+1 \end{vmatrix}$$

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4. Evaluate the following determinant

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

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

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6. Evaluate the deteminant of matrix $\begin{bmatrix} 3 & -4 & 5 \\ 1 & 1 & -2 \\ 2 & 3 & 1 \end{bmatrix}$

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7. Evaluate the following determinants

$$\Delta = \begin{vmatrix} 3 & 4 & -1 \\ 2 & 5 & 0 \\ 6 & 1 & 8 \end{vmatrix}$$

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8. Evaluate the following determinants

$$\Delta = \begin{vmatrix} 0 & \sin a & -\cos a \\ -\sin a & 0 & \sin \beta \\ \cos a & -\sin \beta & 0 \end{vmatrix}$$

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9. Without expanding show that

$$\begin{vmatrix} 102 & 1 & 17 \\ 18 & 3 & 3 \\ 36 & 4 & 6 \end{vmatrix} = 0$$

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10. Without expanding show that

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

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11. Without expanding show that

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

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12. Using properties of determinants , 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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13. Prove that

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

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14. Using properties of determinants, prove the following

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

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15. IF the area of a triangle with vertices (-3,0) (3,0) and (0,k) is 9 sq units.

Then find k.

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16. If the points (2,-3) $(\lambda, -1)$ and $(0, 4)$ are collinear. Then find the value of λ

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17. Find the equation of the line joining (2,3) and (-1,2) using determinants.

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18. Find the equation of line joining P(11,7) and Q(5,5) using determinants Also find the value of k, if R(-1,k) is the point such that area of ΔPQR is $9m^2$

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19. IF $A = \begin{bmatrix} 5 & 6 & -3 \\ -4 & 3 & 2 \\ -4 & -7 & 3 \end{bmatrix}$ then write the cofactor of the element a_{21} of its 2nd row.

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20. Find minors and coafactors of all the elements of determinants $\begin{vmatrix} 2 & -1 \\ 3 & 5 \end{vmatrix}$

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21. Find the minors and coafactors of the elements of first row of determinant $\begin{vmatrix} 1 & 2 & 0 \\ 3 & 5 & -1 \\ 4 & 7 & 8 \end{vmatrix}$

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22. Check whether the matrix $\begin{bmatrix} 2 & 1 & 3 \\ 4 & -1 & 0 \\ -7 & 2 & 1 \end{bmatrix}$ is singular or not

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23. Find the adjoint of the matrix

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

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24. Find the adjoint of the following matrix.

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

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25. Find the adjoint of the matrix $A = \begin{bmatrix} -1 & -2 & -2 \\ 2 & 1 & -2 \\ 2 & -2 & 1 \end{bmatrix}$ and hence show that A (adj A)=$|A|I$

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26. IF $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ then verify the following results

$|adjA| = |A|$

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27. IF $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ then verify the following results

$adj\left(A^T\right) = (adjA)^T$

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28. IF $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ then verify the following results

$|adj(adjA)| = |A|$

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29. find the inverse of following matrices

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

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30. find the inverse of following matrices

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

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31. Find the inverse of the following matrix $\begin{bmatrix} 0 & 0 & 2 \\ 0 & 2 & 0 \\ 2 & 0 & 0 \end{bmatrix}$

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

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33. If $A = \begin{bmatrix} 2 & 3 \\ 1 & -4 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & -2 \\ -1 & 3 \end{bmatrix}$ then verify that $AA^{-1} = I$

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34. If $A = \begin{bmatrix} 2 & 3 \\ 1 & -4 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & -2 \\ -1 & 3 \end{bmatrix}$ find AB

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35. If the matrix A is such that $\begin{bmatrix} 1 & -1 \\ 2 & 3 \end{bmatrix} A = \begin{bmatrix} -4 & 1 \\ 7 & 7 \end{bmatrix}$ then find A.

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36. Solve by Cramer's rule $2x - y = 2, 3x + y = 13$

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37. Examining consistency and solvability, solve the following equation by matrix method.

2x-y+z=4

x+3y+2z=12

3x+2y+3z=16

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38. Using determinants show that the following system of linear equations is inconsistent.

$x - 3y + 5z = 4, 2x + 6y + 10z = 11, 3x + 9y + 15z = 12$

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39. Solve the system of linear equations by matrix method

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

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40. Using matrix method solve the following system of linear equations

$5x + y - 7 = 0$

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

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

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41. Given that A= $\begin{bmatrix} 2 & 3 \\ -5 & 4 \end{bmatrix}$ Find A^{-1}.

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42. 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 algrebraically and find the numbers using matrix method.

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Part 1 Question For Practice

1. Determine the maximum value of

$$\begin{vmatrix} \cos x & \sin x \\ -\sin x & \cos x - 1 \end{vmatrix}$$

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2. Write the value of k, if

$$\begin{vmatrix} aa_1 & aa_2 & aa_3 \\ ab_1 & ab_2 & ab_3 \\ ac_1 & ac_2 & ac_3 \end{vmatrix} = k\begin{vmatrix} a_1 & b_1 & c_1 \\ a_2 & b_2 & c_2 \\ a_3 & b_3 & c_3 \end{vmatrix}$$

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3. If ω is a complex cube root of 1,then for what value of. lamda the determinant $\begin{vmatrix} 1 & \omega & \omega^2 \\ \omega & \lambda & 1 \\ \omega^2 & 1 & \omega \end{vmatrix} = 0$?

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4. Evaluate the following : $\begin{bmatrix} \sin^2\theta & \cos^2\theta & 1 \\ \cos^2\theta & \sin^2\theta & 1 \\ -10 & 12 & 2 \end{bmatrix}$

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5. IF ω and ω^2 are the complex cube roots of unity, write the value of the following determinant.

$$\begin{vmatrix} \cos^2 x & -1 & \sin^2 x \\ -2 & 1 & 1 \\ \omega & \omega^2 & 1 \end{vmatrix}$$

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6. What is the value of $\begin{vmatrix} i^{103} & 3 & i^{101} \\ i^{56} & 5 & i^{54} \\ i^{23} & 7 & i^{21} \end{vmatrix}$

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7. If every element of a third order determinant having value 8 is divided by 2, then what is the value of the resulting determinant?

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8. What is the value of $\begin{vmatrix} i^{103} & 3 & i^{101} \\ i^{56} & 5 & i^{54} \\ i^{23} & 7 & i^{21} \end{vmatrix}$

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9. Evaluate $\begin{vmatrix} \sec\theta & -\tan\theta \\ -\tan\theta & \sec\theta \end{vmatrix}$

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10. Evaulate $\begin{vmatrix} \cos 15^\circ, \sin 15^\circ \\ \sin 75^\circ, \cos 75^\circ \end{vmatrix}$

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11. Evaluate $\begin{vmatrix} \log_3 512 & \log_4 3 \\ \log_3 8 & \log_4 9 \end{vmatrix}$

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

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13. IF $\begin{vmatrix} 2x & x+3 \\ 2(x+1) & x+1 \end{vmatrix} = \begin{vmatrix} 1 & 3 \\ -1 & 1 \end{vmatrix}$ then find the value of x.

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14. IF $A = \begin{bmatrix} 2 & 3 \\ 3 & -1 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 3 \\ -1 & 1 \end{bmatrix}$ then write the value of $|AB|$

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15. IF there are two values of a which makes determinant $\Delta = \begin{vmatrix} 1 & -2 & 5 \\ 2 & a & -1 \\ 0 & 4 & 2a \end{vmatrix} = 86$ then find the sum of these numbers.

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16. Evaluate $\begin{vmatrix} \cos a \cos \beta & \cos a \sin \beta & -\sin a \\ -\sin \beta & \cos \beta & 0 \\ \sin a \cos \beta & \sin a \sin \beta & \cos a \end{vmatrix}$

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17. Let A be a square matrix of order 3×3 Write the value of |2A| where |A|=4

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18. IF A is 3×3 matrix $|A| \neq 0$ and $|3A| = k|A|$ then find the value of k.

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19. Without expanding,show that the following determinant vanishes.

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

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20. Write the value of $\Delta = \begin{vmatrix} x+y & y+z & z+x \\ z & x & y \\ -3 & -3 & -3 \end{vmatrix}$

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

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22. Write the value of $\begin{vmatrix} 2 & 7 & 65 \\ 3 & 8 & 75 \\ 5 & 9 & 86 \end{vmatrix}$

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23. Find the value of $\begin{vmatrix} 17 & 58 & 97 \\ 19 & 60 & 99 \\ 18 & 59 & 98 \end{vmatrix}$ without expanding.

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24. Solve for x,

$$\begin{vmatrix} 15-2x & 11 & 10 \\ 11-3x & 17 & 16 \\ 7-x & 14 & 13 \end{vmatrix} = 0$$

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25. IF $\cos 2\theta = 0$ then simplify $\begin{vmatrix} 0 & \cos\theta & \sin\theta \\ \cos\theta & \sin\theta & 0 \\ \sin\theta & 0 & \cos\theta \end{vmatrix}^2$

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

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27. using the properties of determinants prove that

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

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28. Using properties of determinants prove that

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

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29. Prove the that the following. $\begin{bmatrix} (a+1)(a+2) & a+2 & 1 \\ (a+2)(a+3) & a+3 & 1 \\ (a+3)(a+4) & a+4 & 1 \end{bmatrix}$=-2

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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. Solve $\begin{bmatrix} a+x & a-x & a-x \\ a-x & a+x & a-x \\ a-x & a-x & a+x \end{bmatrix} = 0$

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32. IF $\begin{vmatrix} 4-x & 4+x & 4+x \\ 4+x & 4-x & 4+x \\ 4+x & 4+x & 4-x \end{vmatrix} = 0$ then find the value of x

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33. Prove the following : $\begin{bmatrix} 1 & x & x^2 \\ x^2 & 1 & x \\ x & x^2 & 1 \end{bmatrix} = \left(1-x^3\right)^2$

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34. Using properties of determinant prove that

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

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35. IF a,b and c are real numbers and $\Delta = \begin{vmatrix} b+c & c+a & a+b \\ c+a & a+b & b+c \\ a+b & b+c & c+a \end{vmatrix} = 0$

show that either $a+b+c=0$ or $a=b=c$

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36. Using the properties of determinants prove that

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

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

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37. Find the value of x if $\begin{vmatrix} 2x & 3 \\ 1 & x \end{vmatrix} = \begin{vmatrix} 3 & 4 \\ -1 & 2 \end{vmatrix}$

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

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39. If x,y and z are different and

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

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

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41. Show that $\Delta = \Delta_1$ where

$$\Delta = \begin{vmatrix} Ax & x^2 & 1 \\ By & y^2 & 1 \\ Cz & z^2 & 1 \end{vmatrix}, \Delta_1 = \begin{vmatrix} A & B & C \\ x & y & z \\ zy & zx & xy \end{vmatrix}$$

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42. IF $\Delta = \begin{vmatrix} 1 & x & x^2 \\ 1 & y & y^2 \\ 1 & z & z^2 \end{vmatrix}$ and $\Delta_1 = \begin{vmatrix} 1 & 1 & 1 \\ yz & zx & xy \\ x & y & z \end{vmatrix}$ then prove that $\Delta + \Delta_1 = 0$

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43. Using properties of determinants, prove that $\begin{vmatrix} y^2z^2 & yz & y+z \\ z^2x^2 & zx & z+x \\ x^2y^2 & xy & x+y \end{vmatrix} = 0$

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

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45. Find the maximum value of $\Delta = \begin{vmatrix} 1 & 1 & 1 \\ 1 & 1+\sin\theta & 1 \\ 1 & 1 & 1+\cos\theta \end{vmatrix}$ (where θ is real number)

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46. Prove that the following. $\begin{bmatrix} b+c & a & a \\ b & c+a & b \\ c & c & a+b \end{bmatrix}$=4ab

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47. If a, b and c are all positive real, then prove that minimum value of determinant

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

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

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49. Answer any three questions

Using properties of determinants, prove the following

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

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50. Show that

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

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51. Prove that

$$\begin{vmatrix} x & y & z \\ x^2 & y^2 & z^2 \\ yz & zx & xy \end{vmatrix} = \begin{vmatrix} 1 & 1 & 1 \\ x^2 & y^2 & z^2 \\ x^3 & y^3 & z^3 \end{vmatrix} = (x-y)(y-z)(z-x)(xy+yz+zx)$$

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

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53. If a, b and c are all positive real, then prove that minimum value of determinant

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

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54. Prove the following:

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

=2(b+c)(c+a)(a+b)

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Part 2 Question For Practice

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

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2. Find the area of the triangle whose vertices at the points (1,0) (6,0) and (4,3)

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3. If area of a triangle is 35 sq units with vertices (2,-6) (5,4) and (k,4) then find the values of k.

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

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5. using determinants find the area of the triangle whose vertices are (1,4) (2,3) and (-5,-3) Are the given points collinear.

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6. If the points $(a_1, b_1)(a_2, b_2)$ and $(a_1 + a_2, b_1 + b_2)$ are collinear, then show that $a_1 b_2 = a_2 b_1$

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7. Find the value of k if the points (k+1,1),(2k+1,3) and (2k+2,2k) are collinear.

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

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9. If $A(x_1, y_1)$, $B(x_2, y_2)$, and, $C(x_3, y_3)$ are vertices of an equilateral triangle whose each side is equal to a, then prove that

$$\begin{vmatrix} x_1 & y_1 & 2 \\ x_2 & y_2 & 2 \\ x_3 & y_3 & 2 \end{vmatrix}^2 = 3a^4.$$

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10. 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 ΔABD is 3 sq units.

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Part 3 Question For Practice

1. If a_{ij} is an element in ith row and jth column of a 3rd order determinant and c_{ij} be the cofactor of a_{ij}, then what is the value of

$a_{12}c_{12} - a_{21}c_{21} + a_{13}c_{13} - a_{31}c_{31}$?

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2. IF the coafactor and minor of each element of a second order determinant are same, then what is the value of the element is the second row and first column of determinant.

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3. Find the minor of the element of second row of the determinant

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

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4. If A is a matrix of order 3×3 then find the number of minors in determinant A.

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5. Write minors and coafactors of elements of determinant $\begin{vmatrix} 2 & -4 \\ 0 & 3 \end{vmatrix}$

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6. Write minors and coafactors of elements of determinant $\begin{vmatrix} a & c \\ b & d \end{vmatrix}$

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7. Find the minors of the diagonal elements of the determinant $\begin{vmatrix} 1 & i & -i \\ -i & 1 & i \\ 1 & -i & i \end{vmatrix}$

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8. using Coafactors of the elements of second row, evaluate

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

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9. Using coafactors of the elements of third row, evaluate

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

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10. Using Coafactors of elements of third column evaluate

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

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11. Find the value of determinant $\begin{vmatrix} 2 & -3 & 5 \\ 6 & 0 & 4 \\ 1 & 5 & -7 \end{vmatrix}$

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Part 4 Question For Practice

1. For what value of λ, the matrix

$\begin{bmatrix} 1 & \lambda & 0 \\ 3 & -1 & 2 \\ 4 & 1 & 5 \end{bmatrix}$ is singular ?

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2. In the interval $\frac{\pi}{2} < x < \pi$ find the value of x for which the matrix $\begin{bmatrix} 2\sin x & 3 \\ 1 & 2\sin x \end{bmatrix}$ is singular

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3. Find adjA if $A = \begin{bmatrix} 5 & 2 \\ 7 & 3 \end{bmatrix}$

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4. Let A be the non singular square matrix of order 3×3 then prove that

$|adj(A)| = |A|^2$

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5. IF A and B are matrix of order 3 and |A|=5 , |B|=5 then find the value of

|3AB|

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6. If A is matrix of order 3 and |A|=4 then find the value of |adj (A)|

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7. If A is a square matrix of order 3 such that|adj(A)|=64 then find|A|

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8. If $\begin{vmatrix} 2 & \lambda & -3 \\ 0 & 2 & 5 \\ 1 & 1 & 3 \end{vmatrix}$ then A^{-1} exist for which value of λ?

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9. Find the inverse of the matrix $\begin{bmatrix} 2 & -2 \\ 4 & 3 \end{bmatrix}$

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10. Find the inverse of the matrix $\begin{bmatrix} \cos\theta & \sin\theta \\ -\sin\theta & \cos\theta \end{bmatrix}$

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11. If A is a matrix of order 3×3 then show that $\left(A^2\right)^{-1} = \left(A^{-1}\right)^2$

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12. If A is a matrix of order 2×2 and |A|=5 find the value of $|adj(A)|$

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13. IF A and B are invertible matrices, then which of the following is incorrect?

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

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14. IF A and B are invertible matrices, then which of the following is incorrect?

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

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15. If $\begin{bmatrix} 3 & 5 & 3 \\ 2 & 4 & 2 \\ \lambda & 7 & 8 \end{bmatrix}$ is a singular matrix, write the value of lambda.

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16. Find the adjoint of the following matrix.

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

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17. Find the adjoint of the matrix $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ and verify that $A[adj(A)] = |A|I$

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18. Given $A = \begin{bmatrix} 2 & -3 \\ -4 & 7 \end{bmatrix}$ compute A^{-1} and show that $2A^{-1} = 9I - A$

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19. IF $A = \begin{bmatrix} 1 & \tan x \\ -\tan x & 1 \end{bmatrix}$ then show that $A^T A^{-1} = \begin{bmatrix} \cos 2x & -\sin 2x \\ \sin 2x & \cos 2x \end{bmatrix}$

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20. Let $A = \begin{bmatrix} 3 & 7 \\ 2 & 5 \end{bmatrix}$ and $B = \begin{bmatrix} 6 & 8 \\ 7 & 9 \end{bmatrix}$ then verify that $(AB)^{-1} = B^{-1}A - 1$

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21. Find the value of the determinant

$$\begin{vmatrix} 1 & 0 & 0 \\ 0 & \cos a & \sin a \\ 0 & \sin a & -\cos a \end{vmatrix}$$

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

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23. if $A = \begin{bmatrix} 0 & 1 & 1 \\ 1 & 0 & 1 \\ 1 & 1 & 0 \end{bmatrix}$ then find $\left(A^2 - 3I\right)$

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24. IF $A = \begin{bmatrix} 1 & -2 & 3 \\ 0 & -1 & 4 \\ -2 & 2 & 1 \end{bmatrix}$ then find $A^2 - A$

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25. Find (AB), if $A = \begin{bmatrix} 1 & 1 & 2 \\ 0 & 2 & -3 \\ 3 & -2 & 4 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 2 & 0 \\ 0 & 3 & -1 \\ 1 & 0 & 2 \end{bmatrix}$

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26. Suppose a matrix B of order 2×2 such that $B = \begin{bmatrix} 1 & -2 \\ 1 & 4 \end{bmatrix} = \begin{bmatrix} 6 & 0 \\ 0 & 6 \end{bmatrix}$ Find matrix B by using the inverse of matrix method

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27. If $A = \begin{bmatrix} 2 & 1 \\ 3 & 2 \end{bmatrix}$ and $B = \begin{bmatrix} -3 & 2 \\ 5 & -3 \end{bmatrix}$ then find A+B

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Part 5 Question For Practice

1. Examine the consistency of the following system of equations

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

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2. Examine the consistency of the following system of equations

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

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3. Examine the consistency of the following system of equations

$x + y + z = 1, 2x + 3y + 2z = 2$ and $bx + by + 2bz = 4$

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4. Test whether the following system of equations have non zero solution. Write the solution set.

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

$x - 2y - 3z = 0$

$3x + y - 8z = 0$

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5. Show that for each real value of λ the system of equations

$(\lambda + 3)x + \lambda y = 0, x + (2\lambda + 5)y = 0$ has a unique solution.

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6. If a system of equations $\lambda x + 3y = 0$

$x + (\lambda - 2)y = 0$ has infinitely many solutions, then find the values of λ.

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7. Examine the consistency of the system of equations

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

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8. Solve the system of linear equations using matrix method

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

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9. Solve the system of linear equations using matrix method

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

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10. Show that the following systems of linear equations is consistent and also find their solution $x + 2y = 2$ and $2x + 3y = 3$

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11. $3x + 2y + z = 2,\ 2x + y - 3z = 5 \text{ and } -x + 2y + z = 6$

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12. $x + y - z = 3,\ 2x + 3y + z = 10 \text{ and } 3x - y - 7z = 1$

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13. $x - y + 2z = 7,\ 3x + 4y - 5z = -5 \text{ and } 2x - y + 3z = 12$

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14. $x + 2y + z = 7,\ x + 3z = 11 \text{ and } 2x - 3y = 1$

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15. $2x + y + z = 1,\ x - 2y - z = \dfrac{3}{2} \text{ and } 3y - 5z = 9$

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16. Solve the following system of equations by matrix method where $x \neq 0, y \neq 0$ and $z \neq 0$

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

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17. Using matrix method solve the following system of equations

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

where x,y and $z \neq 0$

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18. Find A^{-1} where $A = \begin{bmatrix} 1 & 2 & -3 \\ 2 & 3 & 2 \\ 3 & -3 & -4 \end{bmatrix}$ Hence solve the system of equations

$x + 2y - 3z = -4, 2x + 3y + 2z = 2 \text{ and } 3x - 3y - 4z = 11$

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19. IF $A = \begin{bmatrix} 1 & 2 & 1 \\ -1 & 1 & 1 \\ 1 & -3 & 1 \end{bmatrix}$ then find A^{-1} and hence solve the system of equations $x + 2y + z = 4, \ -x + y + z = 0 \text{ and } x - 3y + z = 4$

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20. If $A = \begin{bmatrix} 1 & 2 & 0 \\ -2 & -1 & -2 \\ 0 & -1 & 1 \end{bmatrix}$ then find A^{-1} Using A^{-1} solve the system of linear equations

$x - 2y = 10$

$2x - y - z = 8$

$-2y + z = 7$

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21. Determine the product of $A = \begin{bmatrix} -4 & 4 & 4 \\ -7 & 1 & 3 \\ 5 & -3 & -1 \end{bmatrix} \begin{bmatrix} 1 & -1 & 1 \\ 1 & -2 & -2 \\ 2 & 1 & 3 \end{bmatrix}$

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22. Suppose $A = \begin{bmatrix} 2 & 2 & -4 \\ -4 & 2 & -4 \\ 2 & -1 & 5 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & -1 & 0 \\ 2 & 3 & 4 \\ 0 & 1 & 2 \end{bmatrix}$ Then find BA and use this to solve the syetm of equations

$y + 2x = 7$

$x - y = 3$

$2x + 3y + 4z = 17$

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23. Use matrix 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 equation

$x - y + 2z = 1$

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

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24. Solve the following system of equations by the matrix inversion method.

$x + y + z = 4$

$2x - y + 3z = 1$

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

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25. Solve the matrix inversion method

$x + 2y + 3z = 8, 2x + y + z = 8$ and $x + y + 2z = 6$

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26. Solve by matrix inversion method.

$x + y + z = 2$

$2x + y + z = 4$

$x + y - z = 1$

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27. Solve by matrix inversion method.

$x - 2y = 3$

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

$5x - 3z = -1$

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

$x - y + z = 4$

$2x + y - 3z = 0$

$x + y + z = 2$

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Odisha Bureau S Textbook Solutions Exercise 5 A

1. Evaluate the following determinants

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

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2. Evaluate the following determinants

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

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3. Evaluate the following determinants. $\begin{bmatrix} \sec\theta & \tan\theta \\ \tan\theta & \sec\theta \end{bmatrix}$

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4. Evaluate the following determinants

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

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5. Evaluate the following determinants. $\begin{bmatrix} 1 & \omega \\ -\omega & \omega \end{bmatrix}$

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6. Evaluate the following determinants

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

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7. Evaluate the following determinants

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

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8. Evaluate the following determinants

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

Watch Video Solution

9. Evaluate the following determinants

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

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10. Evaluate the following determinants

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

Watch Video Solution

11. Evaluate the following determinants

$$\begin{vmatrix} 1 & x & x \\ 0 & \sin x & \sin y \\ 0 & \cos x & \cos y \end{vmatrix}$$

Watch Video Solution

12. Evaluate the following determinants

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

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13. Evaluate the following determinants

$$\begin{vmatrix} 0.2 & 0.1 & 3 \\ 0.4 & 0.2 & 7 \\ 0.6 & 0.3 & 2 \end{vmatrix}$$

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14. Evaluate the following determinants. $\begin{bmatrix} 1 & \omega & \omega^2 \\ \omega & \omega^2 & 1 \\ \omega^2 & 1 & \omega \end{bmatrix}$

Watch Video Solution

15. Evaluate the following determinants

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

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16. Evaluate the following determinants

$$\begin{vmatrix} -6 & 0 & 0 \\ 3 & -5 & 7 \\ 2 & 8 & 11 \end{vmatrix}$$

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17. Evaluate the following determinants

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

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18. Evaluate the following determinants

$$\begin{vmatrix} -18 & 17 & 19 \\ 3 & 0 & 0 \\ -14 & 5 & 2 \end{vmatrix}$$

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19. State true or false. If the first and second rows of a determinant be interchanged then the sign of the determinant is changed.

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20. State true or false. If first and third rows of a determinant be interchanged then the sign of the determinant does not change.

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21. State true or false. If in a third order determinant first row be changed to second column. Second row to 1st column and third row to third column, then the value of the determinant does not change.

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22. State true or false. A row and a column of a determinant can have two or more common elements.

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23. State true or false. The minor and the co-factor of the element a_{32} of a determinant of third order are equal.

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24. State true of false. $\begin{bmatrix} 3 & 1 & 3 \\ 0 & 4 & 0 \\ 1 & 3 & 1 \end{bmatrix}$=0

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25. State True or False

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

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26. State true of false. $\begin{bmatrix} 2 & 3 & 4 \\ 5 & 6 & 7 \\ 1 & 2 & 3 \end{bmatrix} = \begin{bmatrix} 4 & 2 & 3 \\ 7 & 5 & 6 \\ 3 & 1 & 2 \end{bmatrix}$

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27. What is the value of $\begin{vmatrix} 0 & 8 & 0 \\ 25 & 520 & 25 \\ 1 & 410 & 0 \end{vmatrix}$?

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28. IF ω is cube root of unity, then $\begin{vmatrix} 1 & \omega & \omega^2 \\ \omega & \omega^2 & 1 \\ \omega^2 & 1 & \omega \end{vmatrix}$ = ...$(1, 0, \omega, \omega^2)$

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29. Evaluate $\begin{bmatrix} 1 & a & b+c \\ 1 & b & c+a \\ 1 & c & a+b \end{bmatrix}$

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30. If $\begin{vmatrix} a & b & c \\ b & a & b \\ x & b & c \end{vmatrix} = 0$ then `x=___.

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31. Fill in the blanks with appropriate answer from the brackets.

$$\begin{bmatrix} a_1 + a_2 & a_3 + a_4 & a_5 \\ b_1 + b_2 & b_3 + b_4 & b_5 \\ c_1 + c_2 & c_3 + c_4 & c_5 \end{bmatrix}$$

can be expressed at the most as ______, different 3rd order determinants.

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32. What is the minimum value of $\begin{vmatrix} \sin x & \cos x \\ -\cos x & 1+\sin x \end{vmatrix}$?

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33. Fill in the blanks with appropriate answer from the brackes. The determinant $\begin{bmatrix} 1 & 1 & 1 \\ 1 & 2 & 3 \\ 1 & 3 & 6 \end{bmatrix}$ is equal to _______.

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34. Fill in the blanks with appropriate answer from the brackets. With 4 different elements we can construct _______ number of different determinants of order 2.

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35. Solve the following : $\begin{bmatrix} 4 & x+1 \\ 3 & x \end{bmatrix}$=5

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36. Solve the following : $\begin{bmatrix} x & a & a \\ m & m & m \\ b & x & b \end{bmatrix}$=0

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37. Solve the following : $\begin{bmatrix} 7 & 6 & x \\ 2 & x & 2 \\ x & 3 & 7 \end{bmatrix}$=0

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38. Solve the following : $\begin{bmatrix} 0 & x-a & x-b \\ x+a & 0 & x-c \\ x+b & x+c & 0 \end{bmatrix}$=0

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39. Factorize the following. $\begin{bmatrix} x+a & b & c \\ b & x+c & a \\ c & a & x+b \end{bmatrix}$

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40. Solve the following : $\begin{bmatrix} 1+x & 1 & 1 \\ 1 & 1+x & 1 \\ 1 & 1 & 1+x \end{bmatrix}$ =0

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41. Solve the following : $\begin{bmatrix} 1 & 4 & 20 \\ 1 & -2 & 5 \\ 1 & 2x & 5x^2 \end{bmatrix}$ =0

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42. Solve the following : $\begin{bmatrix} x+1 & \omega & \omega^2 \\ \omega & x+\omega^2 & 1 \\ \omega^2 & 1 & x+\omega \end{bmatrix}$ =0

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43. Solve the following : $\begin{bmatrix} 2 & 2 & x \\ -1 & x & 4 \\ 1 & 1 & 1 \end{bmatrix}$=0

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44. Solve the following : $\begin{bmatrix} x & 1 & 3 \\ 1 & x & 1 \\ 3 & 6 & 3 \end{bmatrix}$=0

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45. Evaluate the following : $\begin{bmatrix} 2 & 3 & 4 \\ 1 & -1 & 3 \\ 4 & 1 & 10 \end{bmatrix}$

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46. Evaluate the following : $\begin{bmatrix} x & 1 & 2 \\ y & 3 & 1 \\ z & 2 & 2 \end{bmatrix}$

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47. Evaluate the following : $\begin{bmatrix} x & 1 & -1 \\ 2 & y & 1 \\ 3 & -1 & z \end{bmatrix}$

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48. Evaluate the following : $\begin{bmatrix} a & h & g \\ h & b & f \\ g & f & c \end{bmatrix}$

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49. Evaluate the following : $\begin{bmatrix} 8 & -1 & -8 \\ -2 & -2 & -2 \\ 3 & -5 & -3 \end{bmatrix}$

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50. Evaluate the following : $\begin{bmatrix} \sin^2\theta & \cos^2\theta & 1 \\ \cos^2\theta & \sin^2\theta & 1 \\ -10 & 12 & 2 \end{bmatrix}$

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51. Evaluate the following : $\begin{bmatrix}-1 & 3 & 2 \\ 1 & 3 & 2 \\ 1 & -3 & -1\end{bmatrix}$

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52. Evaluate the following : $\begin{bmatrix}11 & 23 & 31 \\ 12 & 19 & 14 \\ 6 & 9 & 7\end{bmatrix}$

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53. Evaluate the following : $\begin{bmatrix}37 & -3 & 11 \\ 16 & 2 & 3 \\ 5 & 3 & -2\end{bmatrix}$

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54. Evaluate the following : $\begin{bmatrix} 2 & -3 & 4 \\ -4 & 2 & -3 \\ 11 & -15 & 20 \end{bmatrix}$

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55. Show that x=1 is a solution of

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

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56. Show that $(a+1)$ is a factor of $\begin{vmatrix} (a+1) & 2 & 3 \\ 1 & a+1 & 3 \\ 3 & -6 & a+1 \end{vmatrix}$

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57. Show that

$$\begin{bmatrix} a_1 & b_1 & -c_1 \\ -a_2 & b_2 & c_2 \\ a_3 & b_3 & -c_3 \end{bmatrix} = \begin{bmatrix} a_1 & b_1 & c_1 \\ a_2 & b_2 & c_2 \\ a_3 & b_3 & c_3 \end{bmatrix}$$

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58. Prove that the following. $\begin{bmatrix} a & b & c \\ x & y & z \\ p & q & r \end{bmatrix} = \begin{bmatrix} y & b & q \\ x & a & p \\ z & c & r \end{bmatrix} = \begin{bmatrix} x & y & z \\ p & q & r \\ a & b & c \end{bmatrix}$

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59. Prove that

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

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60. Prove that the following. $\begin{bmatrix} b+c & c+a & a+b \\ q+r & r+p & p+q \\ y+z & z+x & x+y \end{bmatrix} = 2\begin{bmatrix} a & b & c \\ p & q & r \\ x & y & z \end{bmatrix}$

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61. Prove that the following. $\begin{bmatrix} (a+1)(a+2) & a+2 & 1 \\ (a+2)(a+3) & a+3 & 1 \\ (a+3)(a+4) & a+4 & 1 \end{bmatrix}$=-2

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62. Prove that the following. $\begin{bmatrix} a+d & a+d+k & a+d+c \\ c & c+b & c \\ d & d+k & d+c \end{bmatrix}$=abc

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63. Prove that the following. $\begin{bmatrix} 1 & 1 & 1 \\ b+c & c+a & c+a \\ b^2+c^2 & c^2+a^2 & a^2+b^2 \end{bmatrix}$=(b-c)(c-a)(a-b)

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

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65. Prove that the following. $\begin{bmatrix} b+c & a & a \\ b & c+a & b \\ c & c & a+b \end{bmatrix}$=4ab

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66. Prove that the following. $\begin{bmatrix} b^2+c^2 & ab & ac \\ ab & c^2+a^2 & bc \\ ca & cb & a^2+b^2 \end{bmatrix} = 4a^2b^2c^2$

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67. Prove that the following. $\begin{bmatrix} a & b & c \\ a^2 & b^2 & c^2 \\ bc & ca & ab \end{bmatrix}$=(b-c)(c-a)(a-b)(bc+ca+ab)

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68. Prove that the following.

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

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69. Prove that the following.

$$\begin{vmatrix} (v+w)^2 & u^2 & u^2 \\ v^2 & (w+u)^2 & v^2 \\ w^2 & w^2 & (u+v)^2 \end{vmatrix} = 2uvw(u+v+w)^3$$

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70. Factorize the following. $\begin{bmatrix} x+a & b & c \\ b & x+c & a \\ c & a & x+b \end{bmatrix}$

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71. Factorize the following. $\begin{bmatrix} a & b & c \\ b+c & c+a & a+b \\ a^2 & b^2 & c^2 \end{bmatrix}$

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72. Factorize the following. $\begin{bmatrix} x & 2 & 3 \\ 1 & x+1 & 3 \\ 1 & 4 & x \end{bmatrix}$

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73. Show that by eliminating α and β from the equations.

$a_i\alpha + b\beta_i + c_i$=0, i=1,2,3 we get

$\begin{bmatrix} a_1 & b_1 & c_1 \\ a_2 & b_2 & c_2 \\ a_3 & b_3 & c_3 \end{bmatrix}$ =0

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74. Prove the following : $\begin{bmatrix} 1 & bc & a(b+c) \\ 1 & ca & b(c+a) \\ 1 & ab & c(a+b) \end{bmatrix}$ =0

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75. Prove the following : $\begin{bmatrix} x+4 & 2x & 2x \\ 2x & x+4 & 2x \\ 2x & 2x & x+4 \end{bmatrix} - (5x+4)(4-x)^2$

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76. Prove the following : $\begin{bmatrix} \sin\alpha & \cos\alpha & \cos(\alpha+\delta) \\ \sin\beta & \cos\beta & \cos(\beta+\delta) \\ \sin\alpha & \cos\gamma & \cos(\gamma+\delta) \end{bmatrix}$=0

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77. Prove the following : $\begin{bmatrix} 1 & x & x^2 \\ x^2 & 1 & x \\ x & x^2 & 1 \end{bmatrix} = \left(1-x^3\right)^2$

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78. Prove that the points : $(x_1, y_1), (x_2, y_2), (x_3, y_3)$

are collinear if $\begin{bmatrix} x_1 & y_1 & 1 \\ x_2 & y_2 & 1 \\ x_3 & y_3 & 1 \end{bmatrix}$=0

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79. If A+B+C = π, prove that

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

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80. Eliminate x,y,z from

a=x/y-z, b=y/z-x, c=z/x-y

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81. Given the equations

x=cy+bz, y=az+cx and z=bx+ay

where x,y and z are not all zero, prove that $a^2+b^2+c^2+2abc=1$ by determinant method.

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82. If ax+hy+g=0, hx+by+f=0 and gx+fy+c=λ, find the value of λ in the form of a determinant.

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Odisha Bureau S Textbook Solutions Exercise 5 B

1. Write the number of solution of the following system of equation. x-2y=0

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2. Write the number of solution of the following system of equation. x-y=0 and 2x-2y=1

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3. Write the number of solution of the following system of equation. 2x+y=2 and -x-1/2 y=3

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4. Write the number of solution of the following system of equation. 2x+y=2 and -x-1/2 y=3

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5. Write the number of solution of the following system of equation. 3x+2y=1 and x+5y=6

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6. Write the number of solution of the following system of equation.

x+y+z=1

x+y+z=2

2x+3y+z=0

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7. Write the number of solutions of the following system of equations

$x + 4y - z = 0$

$3x - 4y - z = 0$

$x - 3y + z = 0$

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8. Write the number of solutions of the following system of equations

$x + y - z = 0$

$3x - y - z = 0$

$x - 3y + z = 0$

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9. Write the number of solution of the following system of equation.

$a_1x + b_1y + c_1z = 0$

$a_2x + b_2y + c_2z = 0$

$a_3x + b_3y + c_3z = 0$

and $\begin{bmatrix} a_1 & b_1 & c_1 \\ a_2 & b_2 & c_2 \\ a_3 & b_3 & c_3 \end{bmatrix}$ =0

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10. Show that the following system is inconsistent.

(a-b)x+(b-c)y+(c-a)z=0

$(b-c)x+(c-a)y+(a-b)z=0$

$(c-a)x+(a-b)y+(b-c)z=1$

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11. The system of equations

$x+2y+3z=4$

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

$3x+4y+5z=6$ has

A. infinitely many solutions

B. no solution

C. a unique solution

D. none of the above

Answer: A

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12. IF the system of equations

$2x + 5y + 8z = 0$

$x + 4y + 7z = 0$

$6x + 9y + \lambda z = 0$ has a non trivial solution, then λ is equal to

A. 12

B. -12

C. 0

D. none of the above

Answer: B

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13. The system of linear equations

x+y+z=2

2x+y-z=3

3x+2y+kz=4

has a unique solution if

A. $k \neq 0$

B. $-1 < k < 1$

C. $-2 < k < 2$

D. $k = 0$

Answer: A

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14. The equations

x+y+z=6

x+2y+3z=10

x+2y+mz=n

given infinite number of value of the triplet (x,y,z,) if

A. $m = 3, n \in R$

B. $m=3, n \neq 10$

C. $m=3n=10$

D. none of the above

Answer: C

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15. The system of equations

$2x-y+z=0$

$x-$ 2lamda$+z=0$

x-y+2z=0` has infinite number of nontrivial solutions for

A. $\lambda=1$

B. $\lambda=5$

C. $\lambda=-5$

D. no real value of λ

Answer: B

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16. The system of equations

$a_1x + b_1y + c_1z = 0$

$a_2x + b_2y + c_2z = 0$

$a_3x + b_3y + c_3z = 0$ with $\begin{vmatrix} a_1 & b_1 & c_1 \\ a_2 & b_2 & c_2 \\ a_3 & b_3 & c_3 \end{vmatrix}$ has

A. more than two solutions

B. one trivial and one nontrivial solutions

C. No solutions

D. Only trivial solutions

Answer: A

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17. Can the inverse of the following matric be found ?

$$\begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$$

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18. Can the inverse of the following matric be found ?

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

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19. Can the inverse of the following matric be found ?

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

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20. Can the inverse of the following matric be found ?

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

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21. Can the inverse of the following matric be found ?

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

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22. Find the inverse of the following :

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

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23. Find the inverse of the following :

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

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24. Find the inverse of the following :

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

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25. Find the inverse of the following :

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

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26. Find the inverse of the following :

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

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27. Find the inverse of the following :

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

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28. Find the inverse of the following :

$[[i, \ -i], [i, i]$

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29. Find the inverse of the following :

$\begin{bmatrix} x & -x \\ x & x^2 \end{bmatrix}$,x ne 0, x ne -1`

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30. Find the adjoint of the following matrice.

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

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31. Evalute the determinant

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

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32. Find the adjoint of the following matrice.

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

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33. Find the adjoint of the following matrice.

$$\begin{bmatrix} 1 & 3 & 0 \\ 2 & -1 & 6 \\ 5 & -3 & 1 \end{bmatrix}$$

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34. Which of the following matrice is invertible?

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

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35. Which of the following matrices are invertible

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

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36. Which of the following matrices are invertible

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

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37. Which of the following matrice is invertible?

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

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38. Examining consistency and solvability, solve the following equation by matrix method.

x-y+z=4

2x+y-3z=0

x+y+z=2

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39. Examining consistency and solvability, solve the following equation by matrix method.

x+2y-3z=4

2x+4y-5z=12

3x-y+z=3

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40. Examining consistency and solvability, solve the following equation by matrix method.

2x-y+z=4

x+3y+2z=12

3x+2y+3z=16

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41. Examining consistency and solvability solve the following equations by matrix method.

$x + y + z = 4$

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

$x + 7y - 7z = 5$

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42. Examining consistency and solvability, solve the following equation by matrix method.

x+y+z=4

2x-y+3z=1

3x+2y-z=1

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43. Examining consistency and solvability solve the following equations by matrix method.

$x + y - z = 6$

$2x + 3y + z = 1$

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

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44. Examining consistency and solvability, solve the following equation by matrix method.

x-2y=3

3x+4y-z=-2

5x-3z=-1

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45. Examining consistency and solvability solve the following equations by matrix method.

$x + 2y + 3z = 14$

$2x - y + 5z = 15$

$2y + 4z - 3z = 13$

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46. Examining consistency and solvability solve the following equations by matrix method.

$2x + 3y - z = 11$

$x + y + z = 6$

$8x - y + 10z = 34$

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47. Given the matrices.

A= $\begin{bmatrix} 1 & 2 & 3 \\ 3 & -2 & 1 \\ 4 & 2 & 1 \end{bmatrix}, X = \begin{bmatrix} x \\ y \\ z \end{bmatrix}$ and C= $\begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}$

write down the linear equations given by AX=C and solve it for x, y, z by matrix method.

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48. Find x if $\begin{bmatrix} 1 & 1 & 1 \\ 1 & x & -1 \\ 2 & 1 & -1 \end{bmatrix}$ is singular

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49. Answer the following:

If every element of a third order matrix is multiplied by 5, then how many times its determinant value becomes?

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50. What is the value of x if

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

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51. Answer the following:

What are the values of x and y if

$$\begin{bmatrix} x & y \\ 1 & 1 \end{bmatrix} = 2, \begin{bmatrix} x & 3 \\ y & 2 \end{bmatrix} = 1 ?$$

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52. Answer the following:

What is the value of x if

$$\begin{bmatrix} x+1 & 1 & 1 \\ 1 & 1 & -1 \\ -1 & 1 & 1 \end{bmatrix} = 4\,?$$

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53. Answer the following:

What is the value of $\begin{bmatrix} o & -h & -g \\ h & o & -f \\ g & f & o \end{bmatrix}$?

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54. Answer the following:

What is the value of $\begin{bmatrix} \frac{1}{a} & 1 & bc \\ \frac{1}{b} & 1 & ca \\ \frac{1}{c} & 1 & ab \end{bmatrix}$

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55. What is the coafactor of 4 in the determinant

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

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56. Answer the following: In which inverval does the determinant

A = $\begin{bmatrix} 1 & \sin\theta & 1 \\ -\sin\theta & 1 & \sin\theta \\ -1 & -\sin\theta & 1 \end{bmatrix}$ lie?

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57. IF x+y+z=π what is the value of ,

$$\Delta = \begin{vmatrix} \sin(x+y+z) & \sin B & \sin C \\ -\sin B & 0 & \tan A \\ \cos(A+B) & -\tan A & 0 \end{vmatrix}$$

where A,B,C are the angles of the triangle.

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58. Evaluate the following determinants

$$\begin{vmatrix} 14 & 3 & 28 \\ 17 & 9 & 34 \\ 25 & 9 & 50 \end{vmatrix}$$

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59. Evaluate the following determinants

$$\begin{vmatrix} 16 & 19 & 13 \\ 15 & 18 & 12 \\ 14 & 17 & 11 \end{vmatrix}$$

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60. Evaluate the following determinants:

$$\begin{bmatrix} 224 & 777 & 32 \\ 735 & 888 & 105 \\ 812 & 999 & 116 \end{bmatrix}$$

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61. Evaluate the following determinants

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

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62. Evaluate the following determinants

$$\begin{vmatrix} 1 & 2 & 3 \\ 3 & 5 & 7 \\ 8 & 14 & 20 \end{vmatrix}$$

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63. Evaluate the following determinants:

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

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64. Evaluate the following determinants:

$$\begin{bmatrix} 1 & 0 & -5863 \\ -7361 & 2 & 7361 \\ 1 & 0 & 4137 \end{bmatrix}$$

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65. Evaluate the following determinants:

$$\begin{bmatrix} 265 & 240 & 219 \\ 240 & 225 & 198 \\ 219 & 198 & 181 \end{bmatrix}$$

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66. Evaluate the following determinants:

$$\begin{bmatrix} 0 & a^2 & b \\ b^2 & 0 & a^2 \\ a & b^2 & 0 \end{bmatrix}$$

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67. Evaluate the following determinants:

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

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68. Evaluate the following determinants:

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

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69. Evaluate the following determinants

$$\begin{vmatrix} -\cos^2\theta & \sec^2\theta \\ \cot^2\theta & -\tan^2\theta \end{vmatrix}$$

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70. If $\begin{bmatrix} 1 & 1 & 1 \\ 1 & 1+x & 1 \\ 1 & 1 & 1+y \end{bmatrix} = 0$

what are x and y?

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71. For what value fo x

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

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72. Solve $\begin{bmatrix} x+a & 0 & 0 \\ a & x+b & 0 \\ a & 0 & x+c \end{bmatrix} = 0$

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73. Solve $\begin{bmatrix} a+x & a-x & a-x \\ a-x & a+x & a-x \\ a-x & a-x & a+x \end{bmatrix} = 0$

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74. Solve $\begin{bmatrix} x+a & b & c \\ a & x+b & c \\ a & b & x+c \end{bmatrix} = 0$

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75. Show that x=2 is a root of

$$\begin{bmatrix} x & -6 & -1 \\ 2 & -3x & x-3 \\ -3 & 2x & x+2 \end{bmatrix} = 0$$

Solve this completely,

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76. Evaluate $\begin{bmatrix} 1 & a & bc \\ 1 & b & ca \\ 1 & c & ab \end{bmatrix} - \begin{bmatrix} 1 & a & a^2 \\ 1 & b & b^2 \\ 1 & c & c^2 \end{bmatrix}$

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77. Evaluate $\begin{bmatrix} a & a^2 - bc & 1 \\ b & b^2 - ac & 1 \\ c & c^2 - ab & 1 \end{bmatrix}$

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78. For what value of λ the system of equations

$x + y + z = 6, 4x + \lambda y - \lambda z = 0,$

3x+2y-4z=-5 deos not possess a solution?

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79. If A is a 3×3 matrix and $|A| = 2$, then which matrix is represented by

$A \times adjA$?

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80. If $A = \begin{bmatrix} 0 & -\tan\left(\frac{\alpha}{2}\right) \\ \tan\left(\frac{\alpha}{2}\right) & 0 \end{bmatrix}$ show that

$(I + A)$ =$(I - A)\begin{bmatrix} \cos\alpha & -\sin\alpha \\ \sin\alpha & \cos\alpha \end{bmatrix}$ where $I = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$

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81. If a, b and c are all positive real, then prove that minimum value of determinant

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

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82. Prove the following:

$$\begin{bmatrix} 1 & 1 & 1 \\ a & b & c \\ a^3 & b^3 & c^3 \end{bmatrix}$$

=(b-c)(c-a)(a-b)(a+b+c)

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83. Prove the following:

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

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84. Prove the following:

$$\begin{bmatrix} b^2 - ab & b - c & bc - ac \\ ab - a^2 & a - b & b^2 - ab \\ bc - ac & c - a & ab - a^2 \end{bmatrix} = 0$$

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85. Prove the following:

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

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86. Prove the following:

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

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

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87. Prove the following:

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

$=a^3+b^3+c^3-3abc$

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88. Prove the following:

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

=2(b+c)(c+a)(a+b)

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89. Prove the following:

$$\begin{vmatrix} ax-by-cz & ay+bx & az+cx \\ bx+ay & by-cz-ax & bz+cy \\ cx+az & ay+bz & cz-ax-by \end{vmatrix}$$

$=\left(a^2+b^2+c^2\right)(ax+by+cz)\left(x^2+y^2+z^2\right)$

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90. If 2s=a+b+c show that

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

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91. If $\begin{bmatrix} x & x^2 & x^3-1 \\ y & y^2 & y^3-1 \\ z & z^2 & z^3-1 \end{bmatrix} = 0$

then prove that xyz=1 when x,y,z are non zero and unequal.

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92. Without expanding show that the following determinant is equal to Ax+B where A and B are determinants of order 3 not involning x.

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

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93. If x,y,z are positive and are the pth, qth and rth terms of a G.P. then prove that

$$\begin{vmatrix} \log x & p & 1 \\ \log y & q & 1 \\ \log z & r & 1 \end{vmatrix} = 0$$

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94. If $a_1, a_2, \ldots\ldots., a_n$ are in G.P. and $a_i > 0$ for every i, then find the value of

$$\begin{bmatrix} \log a_n, \log a_{n+1}, \log a_{n+2} \\ \log a_{n+1}, \log a_{n+2}, \log a_{n+3} \\ \log a_{n+2}, \log a_{n+3}, \log a_{n+4} \end{bmatrix}$$

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95. If $f(x) = \begin{bmatrix} 1+\sin^2 x & \cos^2 x & 4\sin 2x \\ \sin^2 x & 1+\cos^2 x & 4\sin 2x \\ \sin^2 x & \cos^2 x & 1+4\sin 2x \end{bmatrix}$

what is the maximum value of f(x).

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96. If $f_r(x), g_r(x), h_r(x) r = 1, 2, 3$ are polynomials in x. Such that $f_r(a) = g_r(a) = h_r(a)$ and $F(x) = \begin{vmatrix} f_1(x) & f_2(x) & f_3(x) \\ g_1(x) & g_2(x) & g_3(x) \\ h_1(x) & h_2(x) & h_3(x) \end{vmatrix}$ Find F.(x) at

x=a

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97. If $f(x) = \begin{vmatrix} \cos x & \sin x & \cos x \\ \cos 2x & \sin 2x & 2\cos 2x \\ \cos 3x & \sin 3x & 3\cos 3x \end{vmatrix}$ find $f^{-1}\left(\frac{\pi}{2}\right)$

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Chapter Practice

1. If $\begin{bmatrix} 3x & 7 \\ -2 & 4 \end{bmatrix} = \begin{bmatrix} 8 & 7 \\ 6 & 4 \end{bmatrix}$ then find the value of x.

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

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3. If $\begin{bmatrix} x+1 & x-1 \\ x-3 & x+2 \end{bmatrix} = \begin{bmatrix} 4 & -1 \\ 1 & 3 \end{bmatrix}$ then write the value of x.

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4. If the determinant of matrix A of order 3×3 is of value 4, then write the value of |3A|

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

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6. Show that without expanding at any stage

$$\begin{vmatrix} \frac{1}{a} & a^2 & bc \\ \frac{1}{b} & b^2 & ca \\ \frac{1}{c} & c^2 & ab \end{vmatrix} = 0$$

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7. Find the area of triangle , whose vertices are (2,7) (1,1) and (10,8)

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

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9. IF A_y is the cofactor of the element a_y 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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10. For what value of matrix $\begin{bmatrix} 6-x & 4 \\ 3-x & 1 \end{bmatrix}$ is a singular matrix?

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11. For what value of x, $A = \begin{bmatrix} 2(x+1) & 2x \\ x & x-2 \end{bmatrix}$ singular matrix

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12. Find x if $\begin{bmatrix} 1 & 2 & x \\ 1 & 1 & 1 \\ 2 & 1 & -1 \end{bmatrix}$ is singular

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13. IF the value of the third order determinant is 12, then find the value of the determinant formed by replacing each element by its cofactor.

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14. IF for the non singular matrix A, $A^2 = I$ then find A^{-1}

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15. A is a non singular symmetric matrix, write whether A^{-1} is symmetric or skew symmetric

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16. 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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17. Prove that $\begin{vmatrix} x & y & z \\ x^2 & y^2 & z^2 \\ x^3 & y^3 & z^3 \end{vmatrix} = xyz(x-y)(y-z)(z-x)$

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18. Prove the following : $\begin{bmatrix} x+4 & 2x & 2x \\ 2x & x+4 & 2x \\ 2x & 2x & x+4 \end{bmatrix} - (5x+4)(4-x)^2$

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19. Prove that: $\begin{vmatrix} 1 & 1+p & 1+p+q \\ 2 & 3+2p & 1+3p+2p \\ 3 & 6+3p & 1+6p+3q \end{vmatrix} = 1$

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20. Without expanding the determinants 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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21. IF a,b and c are in AP then find the value of the determinant

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

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22. Without expanding evaluate the determinant ,

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

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23. 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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24. Using properties of determinants evaluate

$$\begin{vmatrix} 0 & ab^2 & ac^2 \\ a^2b & 0 & bc^2 \\ a^2c & cb^2 & 0 \end{vmatrix}$$

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25. Prove the following:

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

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26. Using properties of determinats show that

$$\begin{vmatrix} a & a+b & a+2b \\ a+2b & a & a+b \\ a+b & a+2b & a \end{vmatrix} = 9b^2(a+b)$$

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27. Prove the following:

$$\begin{bmatrix} b^2 - ab & b - c & bc - ac \\ ab - a^2 & a - b & b^2 - ab \\ bc - ac & c - a & ab - a^2 \end{bmatrix} = 0$$

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28. Evaluate $\begin{vmatrix} 1 & 1 & 1 \\ nC_1 & n + 2C_1 & n + 4C_1 \\ nC_2 & n + 2C_2 & n + 4C_2 \end{vmatrix}$

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

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

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31. IF A= $\begin{bmatrix} 1 & 3 & 3 \\ 1 & 4 & 3 \\ 1 & 3 & 4 \end{bmatrix}$ then find |A|

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32. 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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33. If $A = \begin{bmatrix} 2 & 2 & 1 \\ -2 & 1 & 2 \\ 1 & -2 & 2 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 3 & 2 \\ 1 & 1 & 1 \\ 2 & -3 & 1 \end{bmatrix}$ then find AB

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34. If $F(\alpha)=\begin{bmatrix}\cos a & -\sin a & 0\\ \sin a & \cos a & 0\\ 0 & 0 & 1\end{bmatrix}$ and $G(\beta)=\begin{bmatrix}\cos\beta & 0 & \sin\beta\\ 0 & 1 & 0\\ -\sin\beta & 0 & \cos\beta\end{bmatrix}$

then show that $[F(a)G(\beta)]^{-1}=G(-\beta)F(-\alpha)$

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35. Using matrices solve the following system of equations

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

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36. If $A=\begin{bmatrix}1 & -2 & 1\\ 0 & -1 & 1\\ 2 & 0 & -3\end{bmatrix}$ then find A^{-1} and hence solve the system of

equations $x-2y+z=0, -y+z=-2$ and $2x-3z=10.$

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37. If $A = \begin{bmatrix} 3 & -4 & 2 \\ 2 & 3 & 5 \\ 1 & 0 & 1 \end{bmatrix}$ then find A^{-1} and hence solve the following system of equations, $3x - 4y + 2z = -1, 2x + 3y + 5z = 7$

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38. IF $A = \begin{bmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{bmatrix}$ and $B = \begin{bmatrix} 3 & 1 & -1 \\ 1 & 3 & 1 \\ -1 & 1 & 3 \end{bmatrix}$ then find the product AB.

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

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