



MATHS

BOOKS - MAHAVEER PUBLICATION

DETERMINANTS

Question Bank

1. $|A| = \begin{vmatrix} 4 & 2 \\ -1 & 6 \end{vmatrix}$



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$$2. |b| = \begin{vmatrix} p+1 & q \\ r & s+1 \end{vmatrix}$$



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



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$$4. \text{ Find the value of } x \text{ if } \begin{vmatrix} x & 2 \\ 18 & x \end{vmatrix} = \begin{vmatrix} 6 & 2 \\ 18 & 6 \end{vmatrix}$$



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5. Find the value of $|2A|$ if $A = \begin{vmatrix} 1 & 0 & 1 \\ 0 & 1 & 0 \\ 1 & 0 & 2 \end{vmatrix}$



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6. Show that : The value of

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



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$$7. \Delta = \begin{vmatrix} 1 \times 5 & 2 \times 5 & 3 \times 5 \\ 3 & 1 & 6 \\ 4 & 2 & 1 \end{vmatrix} = 5 \begin{vmatrix} 1 & 2 & 3 \\ 3 & 1 & 6 \\ 4 & 2 & 1 \end{vmatrix}$$



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$$8. \text{ Evaluate } \begin{vmatrix} 2 & 4 & 0 \\ -1 & 1 & 2 \\ 0 & -2 & 1 \end{vmatrix}$$



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$$9. \text{ Evalaute } \begin{vmatrix} 2 & 3 & 4 \\ 8 & 12 & 6 \\ 97 & 98 & 99 \end{vmatrix}$$



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10. Evaluate $\begin{vmatrix} 23 & 13 & 4 \\ 42 & 39 & 12 \\ 67 & 52 & 16 \end{vmatrix}$



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11. Evaluate $\begin{vmatrix} 98 & 81 & 321 \\ 88 & 72 & 423 \\ 55 & 45 & 657 \end{vmatrix}$



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

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13. Prove that
$$\begin{vmatrix} 1 & 1 & 1 \\ 1 & 1 + a & 1 \\ 1 & 1 & 1 + b \end{vmatrix} = ab$$

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14.
$$\begin{pmatrix} 1 & 1 & 1 \\ a & b & c \\ a^2 & b^2 & c^2 \end{pmatrix} = (a - b)(b - c)(c - a)$$



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15. (iii) सारणिक का बिना विस्तार किये हुए सिद्ध करें कि

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



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16. Prove that :

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



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17. Show that
$$\begin{vmatrix} y + z & x & x \\ y & z + x & y \\ z & z & x + y \end{vmatrix} = 4xyz$$



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18. Show that
$$\begin{vmatrix} x & b & c \\ x & b & y \\ y & b & c \end{vmatrix} = b(x - y)(c - y)$$



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19. Prove that the determinate

$$\begin{vmatrix} x & \sin \theta & \cos \theta \\ -\sin \theta & -x & 1 \\ \cos \theta & 1 & x \end{vmatrix} \text{ is independent of } \theta$$



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20. 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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21. Solve the equation

$$|x + a \times \times + a \times \times + a| = 0, a \neq 0$$



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22. Find minors and cofactors of all the

elements of the determinant $\begin{vmatrix} 2 & 1 \\ -5 & -3 \end{vmatrix}$



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23. Solve by Cramer's rule: $3x-2y=4$

$$6x-y=11$$



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24. Solve by Cramer's rule: $3x+2y=4$

$$8x+3y=13$$



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25. Solve by Cramer's rule: $3x-2y=4$

$$x-4y=-2$$



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26. Solve by cramer's rule : $3x-5y=21$

$$5x+y=7$$



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27. Solve by cramer's rule : $x+y+z=3$

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

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



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28. Evaluate the determinates $\begin{vmatrix} 2 & 3 \\ 1 & 7 \end{vmatrix}$



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29. Evaluate the determinates

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



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30. Evaluate the determinates

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



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31. Evaluate the determinates

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



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32. Find the value of x is $\begin{vmatrix} 3 & x \\ x & 1 \end{vmatrix} = \begin{vmatrix} 3 & 2 \\ 4 & 1 \end{vmatrix}$



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33. Find the value of x is $\begin{vmatrix} 2 & 3 \\ 4 & 5 \end{vmatrix} = \begin{vmatrix} x & 3 \\ 2x & 5 \end{vmatrix}$



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34. Using the property of determinants and

without expanding prove that
$$\begin{vmatrix} 2 & 7 & 65 \\ 3 & 8 & 75 \\ 5 & 9 & 86 \end{vmatrix} = 0$$



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35. Using the property of determinants and

without expanding, prove that:

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



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

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



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37. Using the property of determinants and without expanding prove 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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38. Using the property of determinants and without expanding, prove that:

$$\begin{vmatrix} 0a & -b & -a0 & -cbc0 \end{vmatrix} = 0$$



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39. Using the property of determinants and without expanding prove that

$$\begin{vmatrix} p & q & r \\ p^2 & q^2 & r^2 \\ p^3 & q^3 & r^3 \end{vmatrix} = pqr(p - q)(q - r)(r - p)$$



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40. Find the minors and cofactors of the elements of the following determinants:

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



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41. Find the minors and cofactors of the elements of the following determinants:

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



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42. Find the minors and cofactors of the elements of the following determinants:

$$\begin{vmatrix} 2 & -3 & 5 \\ 6 & 0 & 4 \\ 1 & 5 & -7 \end{vmatrix}$$



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43. Find the minors and cofactors of the elements of the following determinants:

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



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44. Solve the system of equations by cramer's rule: $5x-y+4z=5$, $2x+3y+5z=2$, $5x-2y+6z=-1$



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45. Solve the system of equations by cramer's rule: $2x-3y+z=-1$, $3x+y-2z=1$ and $4x-y+z=9$



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46. Solve the system of equations by cramer's rule: $x+y+z=3$, $2x-y+3z=4$ and $x+2y-z=2$



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47. Solve the system of equations by cramer's rule: $5x-y=9$, $3x+y=7$ and $x+y+z=4$



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48. Solve the system of equations by cramer's rule: $x+y+z=1$, $x+2y+z=2$, $x+y+2z=0$



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49. Solve the system of equations by cramer's rule: $3x+y+4z=0$, $5x+y+3z=1$, $x-3y-4z=5$



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50. Solve the system of equations by cramer's

rule: $x+2y-z=3$, $3x-4y+5z=7$ and $7x-y+z=14$



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51. Solve the system of equations by cramer's

rule: $3x+3y-4z=2$, $5x-y=4$ and $8x+2y-3z=7$



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