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ई-पाठशाला कार्यक्रम

Class 12th

MATHS

सारणिक 02

RAPID REVISION



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प्रश्न दर्शाइए की बिन्दु $A(a, b+c), B(b, c+a)$ और $C(c, a+b)$ सरेख हैं।

(2023)

$\Delta = 0$

$$\Delta = \frac{1}{2}\begin{vmatrix} x_1 & y_1 & 1 \\ x_2 & y_2 & 1 \\ x_3 & y_3 & 1 \end{vmatrix}$$

बिन्दु $A(\underset{x_1}{a}, \underset{y_1}{b+c})$, $B(\underset{x_2}{b}, \underset{y_2}{c+a})$, $C(\underset{x_3}{c}, \underset{y_3}{a+b})$

$$\Delta = \frac{1}{2}\begin{vmatrix} a & b+c & 1 \\ b & c+a & 1 \\ c & a+b & 1 \end{vmatrix}$$

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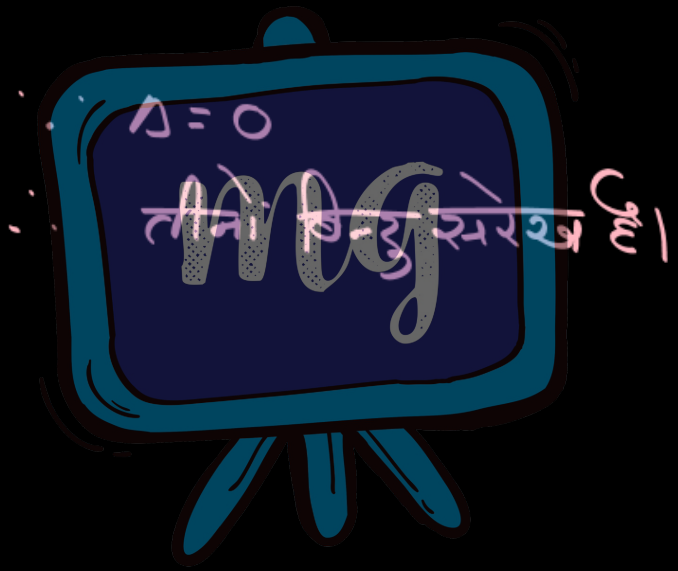
$$\Delta = \frac{1}{2}\left[a\begin{vmatrix} c+a & 1 \\ a+b & 1 \end{vmatrix} - (b+c)\begin{vmatrix} b & 1 \\ c & 1 \end{vmatrix} + 1\begin{vmatrix} b & c+a \\ c & a+b \end{vmatrix}\right]$$

$$= \frac{1}{2}\left\{a\left(c+a-(a+b)\right) - (b+c)(b-c) + 1\left[b(a+b) - c(c+a)\right]\right\}$$

$$= \frac{1}{2}\left\{a(c+a-a-b) - (b^2-c^2) + ab + b^2 - c^2 - ca\right\}$$

$$= \frac{1}{2}\left\{a(c-b) - b^2 + c^2 + ab + b^2 - c^2 - ca\right\}$$

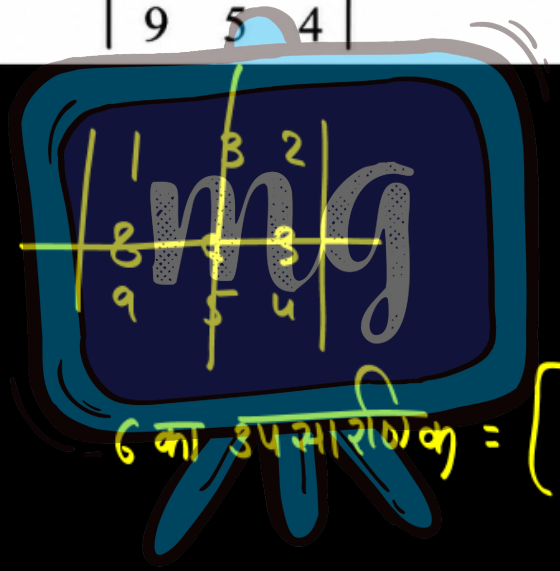
$$= \frac{1}{2}\left\{ac - ab + ab - ca\right\} = \frac{1}{2}\{0\} = 0$$


A = 0
तीनों बिन्दु रेखस्थ हैं।

प्रश्न सारणिक $\begin{vmatrix} 1 & 3 & 2 \\ 8 & 6 & 3 \\ 9 & 5 & 4 \end{vmatrix}$ में अवयव 6 का उपसारणिक ज्ञात कीजिए।

(2023)

हल:-



6 का उपसारणिक = $\begin{bmatrix} 1 & 2 \\ 9 & 5 \end{bmatrix}$

प्रश्न यदि $\begin{vmatrix} 2 & 3 \\ y & x \end{vmatrix} = 3, \begin{vmatrix} x & y \\ 4 & 2 \end{vmatrix} = 5,$ तो x तथा y के मान ज्ञात कीजिए।

(2023)

हल :-

$\begin{vmatrix} 2 & 3 \\ y & x \end{vmatrix} = 3$, $\begin{vmatrix} x & y \\ 4 & 2 \end{vmatrix} = 5$

$2x - 3y = 3$

$2x = 3 + 3y$ —(i)

$2x - 4y = 5$ (ii)

समी (i) से मान रखने पर

$3 + 3y - 4y = 5$

$-y = 5 - 3 \Rightarrow y = 2$

$y = -2$

y का मान समी (i) में रखने पर

$2x = 3 + 3(-2)$

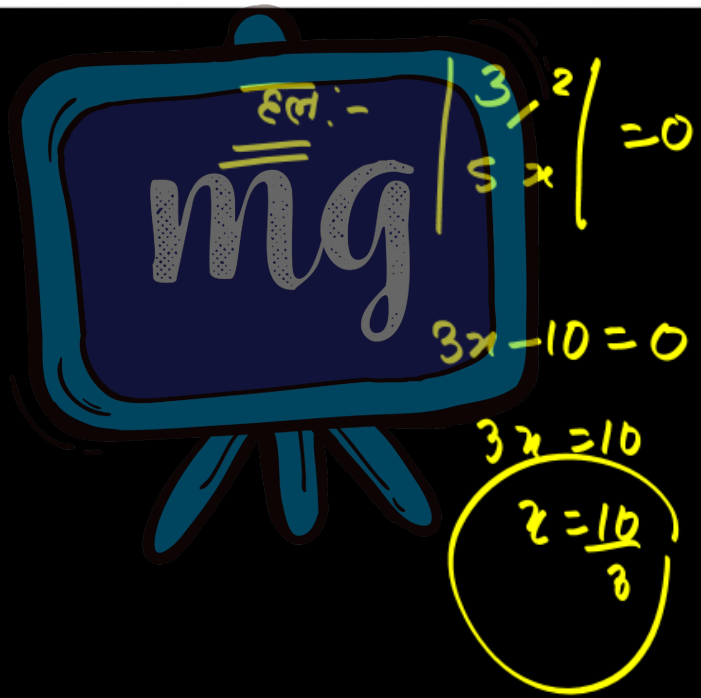
$= 3 - 6$

$2x = -3$

$x = -3/2$

प्रश्न x के किस मान के लिए सारणिक $\begin{vmatrix} 3 & 2 \\ 5 & x \end{vmatrix}$ का मान शून्य होगा ?

(2022)

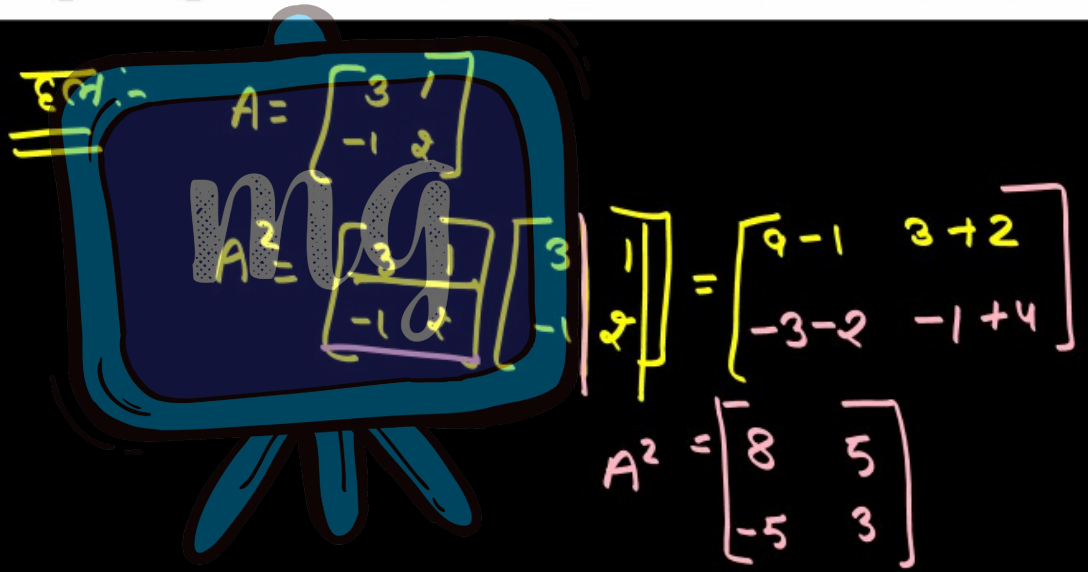


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प्रश्न

यदि $A = \begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix}$ है तो दर्शाइए कि $A^2 - 5A + 7I = O$ है इसकी सहायता से A^{-1} ज्ञात कीजिए।



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$$A^2 - 5A + 7I$$

$$= \begin{bmatrix} 8 & 5 \\ -5 & 3 \end{bmatrix} - 5 \begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix} + 7 \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$$

$$= \begin{bmatrix} 8 & 5 \\ -5 & 3 \end{bmatrix} - \begin{bmatrix} 15 & 5 \\ -5 & 10 \end{bmatrix} + \begin{bmatrix} 7 & 0 \\ 0 & 7 \end{bmatrix}$$

$$= \begin{bmatrix} 8 - 15 + 7 & 5 - 5 + 0 \\ -5 + 5 + 0 & 3 - 10 + 7 \end{bmatrix} = \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix} = 0$$

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$$A^2 - 5A + 7I = 0$$

$$\bar{A}^1(A^2 - 5A + 7I) = \bar{A}^1 \times 0$$

$$(\bar{A}^1 A)A - 5(\bar{A}^1 A) + 7(\bar{A}^1 I) = 0$$

$$IA - 5I + 7\bar{A}^1 = 0$$

$$A - 5I + 7\bar{A}^1 = 0$$

$$7\bar{A}^1 = 5I - A$$

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

$$7\bar{A}^1 = \begin{bmatrix} 5 & 0 \\ 0 & 5 \end{bmatrix} - \begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix}$$

$$7\bar{A}^1 = \begin{bmatrix} 2 & -1 \\ 1 & 3 \end{bmatrix}$$

$$\bar{A}^1 = \frac{1}{7}\begin{bmatrix} 2 & -1 \\ 1 & 3 \end{bmatrix}$$

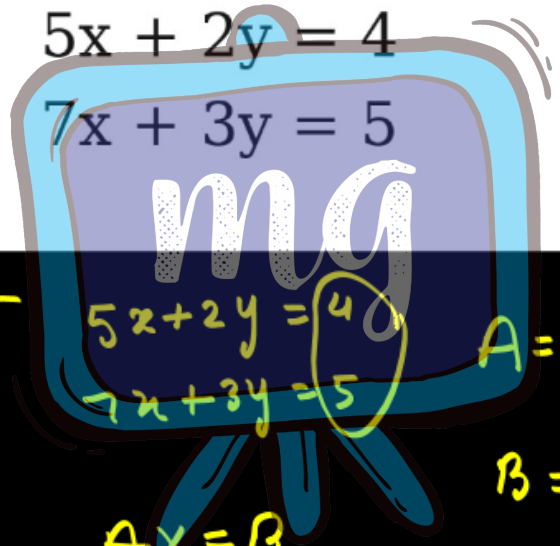
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प्रश्न 1

समीकरण निकाय को आव्यूह विधि से हल कीजिए।

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



हल:-

$$A = \begin{bmatrix} 5 & 2 \\ 7 & 3 \end{bmatrix}$$

$$B = \begin{bmatrix} 4 \\ 5 \end{bmatrix}$$

$$X = \begin{bmatrix} x \\ y \end{bmatrix}$$

$AX = B$

$\Rightarrow \boxed{X = A^{-1}B}$

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$$A = \begin{bmatrix} 5 & 2 \\ -7 & 3 \end{bmatrix}$$

$$|A| = 15 - 14 = 1 \neq 0$$

$$\bar{A}^1 = \frac{1}{|A|}\,\text{adj}\,A$$

$$\text{adj}\,A = \begin{bmatrix} 3 & -2 \\ -7 & 5 \end{bmatrix}$$

$$\bar{A}^1 = \frac{1}{1}\begin{bmatrix} 3 & -2 \\ -7 & 5 \end{bmatrix} = \begin{bmatrix} 3 & -2 \\ -7 & 5 \end{bmatrix}$$

$$X = \bar{A}^1 B$$

$$= \begin{bmatrix} 3 & -2 \\ -7 & 5 \end{bmatrix}\begin{bmatrix} 4 \\ 5 \end{bmatrix}$$

$$= \begin{bmatrix} 12 - 10 \\ -28 + 25 \end{bmatrix}$$

$$\begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 2 \\ -3 \end{bmatrix}$$

$x = 2$

$y = -3$

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प्रश्न

यदि $\Delta = \begin{vmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{vmatrix}$ और a_{ij} का सहखण्ड A_{ij} हो तो Δ का मान निम्नलिखित रूप में व्यक्त किया जाता है:

(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) $a_{11}A_{11} + a_{21}A_{21} + a_{31}A_{31}$

$\Delta = a_{11}A_{11} + a_{12}A_{12} + a_{13}A_{13}$

$\Delta = a_{11}A_{11} + a_{21}A_{21} + a_{31}A_{31}$

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$$\begin{vmatrix} x & y & x+y \\ y & x+y & x \\ x+y & x & y \end{vmatrix}$$ का मान ज्ञात कीजिए।

हल:-

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

$$\Delta = x[(x+y)y - x^2] - y[y^2 - x(x+y)] + (x+y)[xy - (x+y)^2]$$

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$$\Delta = x\left[xy+y^2-x^2\right]-y\left[y^2-x^2-xy\right]+(x+y)\left[xy-(x^2+y^2+2xy)\right]$$

$$= x^2y+xy^2-x^3-y^3+yx^2+xy^2+(x+y)\left[xy-x^2-y^2-2xy\right]$$

$$(x+y)(-x^2-y^2-xy)$$

$$= 2x^2y+2xy^2-x^3-y^3-x^3-xy^2-x^2y-yx^2-y^3-xy^2$$

$$= \cancel{2x^2y}+\cancel{2xy^2}-2x^3-2y^3-\cancel{2xy^2}-\cancel{2x^2y}$$

$$= -2(x^3+y^3)$$