Date:

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Section : A

Subject : Maths

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Q1 $A \begin{bmatrix} 1 & 2 & 6 \\ 2 & 3 & 1 \\ 3 & 1 & 2 \end{bmatrix}$

ID 2nd number = 6

$A^{adj} = ?$

Solution

$A_{11} = (-1)^{1+1}\begin{bmatrix} 3 & 1 \\ 1 & 2 \end{bmatrix} = (1)\begin{bmatrix} 3 & 1 \\ 1 & 2 \end{bmatrix} = 6-1=5$

$A_{12} = (-1)^{1+2}\begin{bmatrix} 2 & 1 \\ 3 & 2 \end{bmatrix} = (-1)(4-3) = -1$

$A_{13} = (-1)^{1+3}\begin{bmatrix} 2 & 3 \\ 3 & 1 \end{bmatrix} = (1)(2-9) = -7$

$A_{21} = (-1)^{2+1}\begin{vmatrix} 2 & 6 \\ 1 & 2 \end{vmatrix} \; (-1)(4-6) = -2$

$A_{22} = (-1)^{2+2}\begin{bmatrix} 1 & 6 \\ 3 & 2 \end{bmatrix} \; (1)(2-18) = -16$

$A_{23} = (-1)^{2+3}\begin{vmatrix} 1 & 2 \\ 3 & 1 \end{vmatrix} = (-1)(1-6) = 5$

$A_{31} = (-1)^{3+1}\begin{vmatrix} 2 & 6 \\ 3 & 1 \end{vmatrix} = (1)(2-18) = -16$

$A_{32} = (-1)^{3+2}\begin{vmatrix} 1 & 6 \\ 2 & 1 \end{vmatrix} = (-1)(1-12) = 11$

$A_{33} = (-1)^{3+3}\begin{vmatrix} 1 & 2 \\ 2 & 3 \end{vmatrix} = (1)(3-4) = -1$

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$$A_{cofactor} = \begin{bmatrix} A_{11} & A_{12} & A_{13} \\ A_{21} & A_{22} & A_{23} \\ A_{31} & A_{32} & A_{33} \end{bmatrix}$$

$$= \begin{bmatrix} 5 & -1 & -7 \\ -2 & -16 & 5 \\ -16 & 11 & -1 \end{bmatrix}$$

now transpose

$$A_{adj} = A^{cofactor} \begin{bmatrix} 5 & -2 & -16 \\ -1 & -16 & 11 \\ -7 & 5 & -1 \end{bmatrix}$$

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Q2 Find the Cofactor of A_{21}, A_{32}, A_{33}

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

Solution

$$A_{21} = (-1)^{2+1} \begin{vmatrix} -2 & 3 \\ -3 & 2 \end{vmatrix} = (-1)(-4+9) = -5$$

$$A_{21} = 5$$

$$A_{31} = (-1)^{3+1} \begin{vmatrix} -2 & 3 \\ 3 & 1 \end{vmatrix} = (1)(-2-9) = -11$$

$$A_{31} = -11$$

$$A_{33} = (-1)^{3+3} \begin{vmatrix} 1 & -2 \\ -2 & 3 \end{vmatrix} = (1)(3-4) = -1$$

$$A_{33} = (-1)$$

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Q3 $A = \begin{bmatrix} 2 & 1 & 1 \\ 1 & 3 & 2 \\ -1 & 1 & 2 \end{bmatrix}$ $I = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$

Solution

Step 1 $|A - \lambda I| = 0$ formula

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

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

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

Now taken Determinent

$$2-\lambda\left(\left(3-\lambda\right)\left(2-\lambda\right)-1\left(2-\left(2-\lambda\right)+1\left(1+1\left(3-\lambda\right)=0\right.\right.\right.$$

$$2-\lambda\left(6-3\lambda-2\lambda+\lambda^2-2\right)-1\left(2-2+\lambda\right)+1\left(1+3-\lambda\right)=0$$

$$2-\lambda\left(\lambda^2-5\lambda+\lambda\right)-1\left(\lambda\right)+1\left(4-\lambda\right)=0$$

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$2d^2 - 16d + 8 - d^3 + 5d^2 - 4d - d + 4 - d = 0$

by ordering.

$-d^3 + 7d^2 - 16d + 12 = 0$

xing by (-1)

$d^2 - 7d^2 + 16d - 12 = 0 \longrightarrow$ (A)

Now put $d - 2 = 0$

then $d = 2$ in above eq4 (A)

$d^3 - 7d^2 + 16d - 12 = 0$

put $d = 2$

$(2)^3 - 7(2)^2 + 16(2) - 12 = 0$

$8 - 7(4) + 32 - 12 = 0$

$8 - 28 + 32 - 12 = 0$

$-20 + 20 = 0$

$0 = 0$

So $d = 2$ or $d - 2 = 0$