Date:

NAME : M. TAHA

Semister : 2

Section : A

ID : 15784

Darsi Notes

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Q. $A \begin{bmatrix} 1 & 2 & 5 \\ 2 & 3 & 1 \\ 3 & 1 & 2 \end{bmatrix}$ 1D 2nd number = 5

$A_{adj} = ?$

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

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

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

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

$A_{22} = (-1)^{2+2} \begin{bmatrix} 1 & 5 \\ 3 & 2 \end{bmatrix} (1)(2-15) = -13$

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

$A_{31} = (-1)^{3+1} \begin{bmatrix} 2 & 5 \\ 3 & 1 \end{bmatrix} = (1)(2-15) = -13$

$A_{32} = (-1)^{3+2} \begin{vmatrix} 1 & 5 \\ 2 & 1 \end{vmatrix} = (-1)(1-10) = +9$

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

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

$$= \begin{pmatrix} 5 & -1 & -7 \\ -2 & -13 & 5 \\ -13 & 9 & -1 \end{pmatrix}$$

Now transpose

$$A_{adj} = A_{cofactor} \begin{pmatrix} 5 & -2 & -13 \\ -1 & -13 & 9 \\ -7 & 5 & -1 \end{pmatrix}$$

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Q2 find the cofactor of A_{21}, A_{31}, A_{33}

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

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

$A_{21} = 5$

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

$A_{31} = -11$

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

$A_{33} = (-1)$

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

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

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

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

Now taken Determinend

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

$$2-\lambda(6-3\lambda-2\lambda+\lambda^2-2) - 1(2-2+\lambda) + 1(1+3-$$

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

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$2\lambda^2 - 10\lambda + 8 - \lambda^3 + 5\lambda^2 - 4\lambda - \lambda + 4 - \lambda = 0$

by ordering

$-\lambda^3 + 7\lambda^2 - 16\lambda + 12 = 0$

xing by (-1).

$\lambda^3 - 7\lambda^2 + 16\lambda - 12 = 0 \longrightarrow (A)$

Now put $\lambda - 2 = 0$

then $\lambda = 2$ in above equ (A)

$\lambda^3 - 7\lambda^2 + 16\lambda - 12 = 0$

put $\lambda = 2$

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

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

$8 - 28 + 32 - 12 = 0$

$-20 + 20 = 0$

$0 = 0$

So $\lambda = 2$ or $\lambda - 2 = 0$