ASSIGNMENT-8

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Download all python codes from

https://github.com/behappy0604/Summer−Internship−IITH/tree/main/Assignment−8

and latex-tikz codes from

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1 Question No. 2.73(b)

Using Cofactors of elements of second row,evaluate $\Delta = \begin{vmatrix} 5 & 3 & 8 \\ 2 & 0 & 1 \\ 1 & 2 & 3 \end{vmatrix}$.

2 Solution

1) We know that $\Delta = \mathbf{a_{21}A_{21}}+\mathbf{a_{22}A_{22}}+\mathbf{a_{23}A_{23}}$
   a_{21}=2, a_{22}=0, a_{23}=1.

2) Here we have to calculate cofactors of the second row, i.e. $\mathbf{A_{21}}$,$\mathbf{A_{22}}$, $\mathbf{A_{23}}$.

$$\mathbf{M_{21}} = \begin{vmatrix} 3 & 8 \\ 2 & 3 \end{vmatrix} = -7 \tag{2.0.1}$$

$$\mathbf{M_{22}} = \begin{vmatrix} 5 & 8 \\ 1 & 3 \end{vmatrix} = 7 \tag{2.0.2}$$

$$\mathbf{M_{23}} = \begin{vmatrix} 5 & 3 \\ 1 & 2 \end{vmatrix} = 7 \tag{2.0.3}$$

- Cofactor of $\mathbf{a_{21}}$ is:

$$\mathbf{A_{21}} = (-1)^{2+1}\mathbf{M_{21}} = (-1)^3 \times -7 = 7 \tag{2.0.4}$$

- Cofactor of $\mathbf{a_{22}}$ is:

$$\mathbf{A_{22}} = (-1)^{2+2}\mathbf{M_{22}} = (-1)^4 \times 7 = 7 \tag{2.0.5}$$

- Cofactor of $\mathbf{a_{23}}$ is:

$$\mathbf{A_{23}} = (-1)^{2+3}\mathbf{M_{23}} = (-1)^5 \times 7 = -7 \tag{2.0.6}$$

3) Now,

$$\Delta = \mathbf{a_{21}A_{21}} + \mathbf{a_{22}A_{22}} + \mathbf{a_{23}A_{23}} \tag{2.0.7}$$

$$\Delta = 2 \times 7 + 0 \times 7 + 1 \times (-7) = 7 \tag{2.0.8}$$