

ASSIGNMENT-8

SENANI SADHU

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1 Question:-

1.1 Let

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

,

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

,

$$C = \begin{bmatrix} 2 & 5 \\ 3 & 8 \end{bmatrix}$$

Find the matrix D such that $CD-AB=0$.

1.2 Solution:-

Order of $A=2 \times 2$ and Order of $B=2 \times 2$.

Order of $AB=2 \times 2$.

So we are doing $CD-AB$

Order of CD =Order of AB

Order of $CD=2 \times 2$

Order of $CD=2 \times 2$

Sp,order of $D=2 \times 2$

Let

$$D = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$$

Now , given

$CD-AB=0$

$$\begin{bmatrix} 2 & 5 \\ 3 & 8 \end{bmatrix} \begin{bmatrix} a & b \\ c & d \end{bmatrix} - \begin{bmatrix} 2 & -1 \\ 3 & 4 \end{bmatrix} \begin{bmatrix} 5 & 2 \\ 7 & 4 \end{bmatrix} = 0$$

$$\begin{bmatrix} 2(a) + 5(c) & 2(b) + 5(d) \\ 3(a) + 8(c) & 3(b) + 8(d) \end{bmatrix} - \begin{bmatrix} 2(5) + (-1)7 & 2(2) + (-1)4 \\ 3(5) + 4(7) & 3(2) + 4(4) \end{bmatrix} = 0$$

$$\begin{bmatrix} 2a + 5c & 2b + 5d \\ 3a + 8c & 3b + 8d \end{bmatrix} - \begin{bmatrix} 10 - 7 & 4 - 4 \\ 15 + 28 & 6 + 16 \end{bmatrix} = 0$$

$$\begin{bmatrix} 2a + 5c & 2b + 5d \\ 3a + 8c & 3b + 8d \end{bmatrix} - \begin{bmatrix} 3 & 0 \\ 43 & 22 \end{bmatrix} = 0$$

$$\begin{bmatrix} 2a + 5c - 3 & 2b + 5d - 0 \\ 3a + 8c - 43 & 3b + 8d - 22 \end{bmatrix} = \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$$

Since matrices are equal,

Corresponding elements are equal

Hence,

$$2a + 5c - 3 = 0 \quad (1)$$

$$3a + 8c - 43 = 0 \quad (2)$$

$$2b + 5d = 0 \quad (3)$$

$$3b + 8d - 22 = 0 \quad (4)$$

Solving(1)

$$2a + 5c - 3 = 0$$

$$2a + 5c = 3$$

$$2a = 3 - 5c$$

$$a = \frac{3 - 5c}{2}$$

Putting value of a in (2)

$$3a + 8c - 43 = 0$$

$$3\left(\frac{3 - 5c}{2}\right) + 8c - 43 = 0$$

$$\frac{3(3 - 5c) + 2(8c) - 2(43)}{2} = 0$$

$$-15c + 16c - 86 + 9 = 0$$

$$c = 77$$

From (1)

$$2a + 5c - 3 = 0$$

Putting value of c=77

$$2a + 5 \times 77 - 3 = 0$$

$$2a = -382$$

$$a = -191$$

From (3)

$$2b + 5d = 0$$

$$b = \left(-\frac{5}{2}\right)d$$

From (4)

$$3b + 8d - 22 = 0$$

Putting value of b

$$3\left(-\frac{5}{2}\right)d + 8d - 22 = 0$$

$$\frac{-15d+16d-44}{2}=0$$

$$d=44$$

From (3) $2b+5d=0$

Putting the value of $d=44$

$$2b+5 \times 44=0$$

$$b=-110$$

Hence, $a=-191$, $b=-110$, $c=77$, $d=44$.

Thus matrix D is,

$$D = \begin{bmatrix} -191 & -110 \\ 77 & 44 \end{bmatrix}$$