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## Assignment - 1

### Practice Questions

Given the following matrices, please solve the questions below and if you can't solve the problem, explain why:

$$A = \begin{bmatrix} 3 & 1 & 5 \\ 6 & 2 & 0 \end{bmatrix} \quad B = \begin{bmatrix} 6 \\ 4 \\ -1 \end{bmatrix} \quad C = \begin{bmatrix} 2 & 4 \\ 3 & 6 \\ -1 & 2 \end{bmatrix} \quad D = \begin{bmatrix} 5 & 2 \\ 3 & 1 \end{bmatrix} \quad E = \begin{bmatrix} 3 & -2 \\ 1 & 4 \end{bmatrix}$$

$$F = \begin{bmatrix} 2 & 1 & 3 \\ 5 & 7 & -2 \end{bmatrix}$$

1)  $A + F$

2)  $E - D$

3)  $C + B$

4)  $C(D)$

5)  $A(F)$

6)  $C^T$

7)  $F^T(E)$

$$1) A + F = \begin{bmatrix} 3 & 1 & 5 \\ 6 & 2 & 0 \end{bmatrix} + \begin{bmatrix} 2 & 1 & 3 \\ 5 & 7 & -2 \end{bmatrix}$$

$$= \begin{bmatrix} 5 & 2 & 8 \\ 11 & 9 & -2 \end{bmatrix}$$

$$2) E - D = \begin{bmatrix} 3 & -2 \\ 1 & 4 \end{bmatrix} - \begin{bmatrix} 5 & 2 \\ 3 & 1 \end{bmatrix}$$

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

$$3) C + B = \begin{bmatrix} 2 & 4 \\ 3 & 6 \\ -1 & 2 \end{bmatrix} + \begin{bmatrix} 6 \\ 4 \\ 1 \end{bmatrix}$$

Can't be added.  $C$  is  $3 \times 2$  but  $B$  is  $3 \times 1$

$$4) C(D) = \begin{bmatrix} 2 & 4 \\ 3 & 6 \\ -1 & 2 \end{bmatrix} \begin{bmatrix} 5 & 2 \\ 3 & 1 \end{bmatrix}$$

$3 \times 2 \qquad \qquad 2 \times 2 \qquad \rightarrow 3 \times 2$

$$= \begin{bmatrix} 2 \times 5 + 4 \times 3 & 2 \times 2 + 4 \times 1 \\ 3 \times 5 + 6 \times 3 & 3 \times 2 + 6 \times 1 \\ -1 \times 5 + 2 \times 3 & -1 \times 2 + 2 \times 1 \end{bmatrix}$$

$$= \begin{bmatrix} 22 & 8 \\ 33 & 12 \\ 1 & 0 \end{bmatrix}$$

$$5) A(F) = \begin{bmatrix} 3 & 1 & 5 \\ 6 & 2 & 0 \end{bmatrix} \begin{bmatrix} 2 & 1 & 3 \\ 5 & 7 & -2 \end{bmatrix}$$

$2 \times 3 \qquad \qquad 2 \times 3$

Multiplication is not possible since number of columns of  $A \neq$  Number of rows of  $F$

$$6) C^T = \begin{bmatrix} 2 & 4 \\ 3 & 6 \\ -1 & 2 \end{bmatrix}^T$$

$$= \begin{bmatrix} 2 & 3 & -1 \\ 4 & 6 & 2 \end{bmatrix}$$

$$7) F^T(E) = \begin{bmatrix} 2 & 1 & 3 \\ 5 & 7 & -2 \end{bmatrix}^T \begin{bmatrix} 3 & -2 \\ 1 & 4 \end{bmatrix}$$

$$= \begin{bmatrix} 2 & 5 \\ 1 & 7 \\ 3 & -2 \end{bmatrix} \begin{bmatrix} 3 & -2 \\ 1 & 4 \end{bmatrix}$$

$3 \times 2$

$2 \times 2$

$\rightarrow 3 \times 2$

$$= \begin{bmatrix} 2(3) + 5(1) & 2(-2) + 5(4) \\ 1(3) + 7(1) & 1(-2) + 7(4) \\ 3(3) + (-2)(1) & 3(-2) + (-2)(4) \end{bmatrix}$$

$$= \begin{bmatrix} 11 & 16 \\ 10 & 26 \\ 7 & -14 \end{bmatrix}$$