4COSC007C Mathematics for Computing

Tutorial 7

1. For each of the pairs of matrices below, calculate the matrix sums **A** + **B** and **A** – **B**.

(i)

$$\mathbf{A} = \begin{pmatrix} 2 & 1 \\ 3 & 0 \end{pmatrix} \qquad \mathbf{B} = \begin{pmatrix} 4 & 6 \\ 2 & -1 \end{pmatrix}$$

(ii)

$$\mathbf{A} = \begin{pmatrix} 1 & 4 & 1 \\ 0 & 2 & 1 \end{pmatrix} \qquad \mathbf{B} = \begin{pmatrix} 2 & -2 & 1 \\ 0 & 2 & -3 \end{pmatrix}$$

2. Consider the given matrices and find **A + B, A – B, and B – A**

$$A = \begin{pmatrix} 2 & 0 \\ 1 & 3 \end{pmatrix} \qquad B = \begin{pmatrix} 5 & 2 \\ 4 & -1 \end{pmatrix}$$

i. Find the solution for a**A** when a = 3, a = 5, and a = 10.

ii. Find the solution for bB when b = 5, b = 2, and b = 7.

iii. Find the transpose matrix of A.

iv. Find the transpose matrix of B

3. Let **A** and **B** be:

$$\mathbf{A} = \begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix} \qquad \mathbf{B} = \begin{pmatrix} 1 & 0 \\ 2 & 1 \end{pmatrix}$$

Show that $\mathbf{A}(2\mathbf{B}) = 2(\mathbf{AB})$

4. Let **A**, **B**, **C** and **D** given by:

$$\mathbf{A} = \begin{pmatrix} 2 & 0 \\ 1 & 3 \end{pmatrix} \qquad \mathbf{B} = \begin{pmatrix} 4 & 6 & 5 \\ 2 & 1 & 3 \end{pmatrix}$$

$$\mathbf{C} = \begin{pmatrix} 1 & 4 & 2 \\ 2 & 3 & 5 \end{pmatrix} \qquad \mathbf{D} = \begin{pmatrix} 1 & 2 \\ 4 & 0 \\ 0 & 3 \end{pmatrix}$$

Without doing the calculations say which of the following matrix products can be formed?

AB CA CD DA DB A^2 D^2

- Find the answers for the matrices that can be multiplied

5. Given that

$$A = \begin{bmatrix} -1 & 2 & 0 \\ 4 & 5 & 3 \end{bmatrix} \quad B = \begin{bmatrix} 7 & 1 & -3 \\ 2 & 0 & 6 \end{bmatrix} \quad C = \begin{bmatrix} 1 & 2 \\ -4 & 9 \end{bmatrix} \quad D = \begin{bmatrix} 11 & 5 \\ 0 & -2 \end{bmatrix} \quad E = \begin{bmatrix} 0 & 1 \\ 1 & 0 \\ 0 & 3 \end{bmatrix}$$

find the following (if possible):

(a) $A + B$ (b) $B + A$ (c) $C + D$ (d) $C - D$ (e) $D - C$

(f) $A + E$ (g) $B - D$ (h) $3A$ (i) $2C + D$ (j) $5B - 4E$

6. Given that $A = \begin{pmatrix} 5 & 2 \\ -2 & -1 \end{pmatrix}$, $B = \begin{pmatrix} -1 & 2 \\ 3 & -2 \end{pmatrix}$ and $C = \begin{pmatrix} 2 & -3 \end{pmatrix}$

Find the following

i. A + B
ii. B – A
iii. A + 3C
iv. 3A
v. 2A – 3B
vi. A^T
vii. B^T
viii. $A^T + B^T$
ix. $A^T - B^T$
x. $B^T - A^T$

7. Find the solutions for the following

a) $X = 3A - 4B,$

$$A = \begin{pmatrix} 4 & -2 \\ 1 & -7 \end{pmatrix},\ B = \begin{pmatrix} -1 & 2 \\ 6 & -5 \end{pmatrix}$$

b) $2X + 4A = 3BA,$

$$A = \begin{pmatrix} 0 & -1 \\ 2 & 1 \end{pmatrix},\ B = \begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix}$$