Exercise 9(B)

1. Evaluate:

(i) 3[5 -2]

Solution:

3[5 -2] = [3x5 3x-2] = [15 -6]

(ii) $7\begin{bmatrix}-1 & 2\\ 0 & 1\end{bmatrix}$

Solution:

$$7\begin{bmatrix}-1 & 2\\ 0 & 1\end{bmatrix} = \begin{bmatrix}-7 & 14\\ 0 & 7\end{bmatrix}$$

(iii) $2\begin{bmatrix}-1 & 0\\ 2 & -3\end{bmatrix} + \begin{bmatrix}3 & 3\\ 5 & 0\end{bmatrix}$

Solution:

$$2\begin{bmatrix}-1 & 0\\ 2 & -3\end{bmatrix} + \begin{bmatrix}3 & 3\\ 5 & 0\end{bmatrix} = \begin{bmatrix}-2 & 0\\ 4 & -6\end{bmatrix} + \begin{bmatrix}3 & 3\\ 5 & 0\end{bmatrix} = \begin{bmatrix}1 & 3\\ 9 & -6\end{bmatrix}$$

(iv) $6\begin{bmatrix}3\\ -2\end{bmatrix} - 2\begin{bmatrix}-8\\ 1\end{bmatrix}$

Solution:

$$6\begin{bmatrix}3\\ -2\end{bmatrix} - 2\begin{bmatrix}-8\\ 1\end{bmatrix} = \begin{bmatrix}18\\ -12\end{bmatrix} - \begin{bmatrix}-16\\ 2\end{bmatrix} = \begin{bmatrix}34\\ -14\end{bmatrix}$$

2. Find x and y if:

(i) 3[4 x] + 2[y -3] = [10 0]

Solution:

Taking the L.H.S, we have

3[4 x] + 2[y -3] = [12 3x] + [2y -6] = [(12 + 2y) (3x - 6)]

Now, equating with R.H.S we get

[(12 + 2y) (3x - 6)] = [10 0]

12 + 2y = 10 and 3x – 6 = 0

2y = -2 and 3x = 6

y = -1 and x = 2

(ii) $x\begin{bmatrix}-1\\2\end{bmatrix} - 4\begin{bmatrix}-2\\y\end{bmatrix} = \begin{bmatrix}7\\-8\end{bmatrix}$

Solution:

We have,

$$x\begin{bmatrix}-1\\2\end{bmatrix} - 4\begin{bmatrix}-2\\y\end{bmatrix} = \begin{bmatrix}7\\-8\end{bmatrix}$$

$$\begin{bmatrix}-x\\2x\end{bmatrix} - \begin{bmatrix}-8\\4y\end{bmatrix} = \begin{bmatrix}-x+8\\2x-4y\end{bmatrix} = \begin{bmatrix}7\\-8\end{bmatrix}$$

So, equating the matrices we get

-x + 8 = 7 and 2x – 4y = -8

x = 1 and 2(1) – 4y = -8

2 – 4y = -8

4y = 10

y = 5/2

3. $Given\ A = \begin{bmatrix}2 & 1\\3 & 0\end{bmatrix}, B = \begin{bmatrix}1 & 1\\5 & 2\end{bmatrix}\ and\ C = \begin{bmatrix}-3 & -1\\0 & 0\end{bmatrix};\ find:$

(i) 2A – 3B + C **(ii) A + 2C - B**

Solution:

(i) 2A – 3B + C

$$= 2\begin{bmatrix}2 & 1\\3 & 0\end{bmatrix} - 3\begin{bmatrix}1 & 1\\5 & 2\end{bmatrix} + \begin{bmatrix}-3 & -1\\0 & 0\end{bmatrix}$$

$$= \begin{bmatrix}4 & 2\\6 & 0\end{bmatrix} - \begin{bmatrix}3 & 3\\15 & 6\end{bmatrix} + \begin{bmatrix}-3 & -1\\0 & 0\end{bmatrix}$$

$$= \begin{bmatrix}4-3-3 & 2-3-1\\6-15+0 & 0-6+0\end{bmatrix}$$

$$= \begin{bmatrix}-2 & -2\\-9 & -6\end{bmatrix}$$

(ii) A + 2C – B

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

4. $If \begin{bmatrix} 4 & -2 \\ 4 & 0 \end{bmatrix} + 3A = \begin{bmatrix} -2 & -2 \\ 1 & -3 \end{bmatrix}; find\ A.$

Solution:

Given,

$$\begin{bmatrix} 4 & -2 \\ 4 & 0 \end{bmatrix} + 3A = \begin{bmatrix} -2 & -2 \\ 1 & -3 \end{bmatrix}$$
$$3A = \begin{bmatrix} -2 & -2 \\ 1 & -3 \end{bmatrix} - \begin{bmatrix} 4 & -2 \\ 4 & 0 \end{bmatrix}$$
$$3A = \begin{bmatrix} -2-4 & -2+2 \\ 1-4 & -3-0 \end{bmatrix} = \begin{bmatrix} -6 & 0 \\ -3 & -3 \end{bmatrix}$$
$$A = \begin{bmatrix} -2 & 0 \\ -1 & -1 \end{bmatrix}$$

5. $Given\ A = \begin{bmatrix} 1 & 4 \\ 2 & 3 \end{bmatrix}\ and\ B = \begin{bmatrix} -4 & -1 \\ -3 & -2 \end{bmatrix}$

(i) find the matrix 2A + B.
(ii) find a matrix C such that:

$$C + B = \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$$

Solution:

(i) 2A + B

$$= 2\begin{bmatrix}1 & 4\\2 & 3\end{bmatrix} + \begin{bmatrix}-4 & -1\\-3 & -2\end{bmatrix}$$
$$= \begin{bmatrix}2 & 8\\4 & 6\end{bmatrix} + \begin{bmatrix}-4 & -1\\-3 & -2\end{bmatrix}$$
$$= \begin{bmatrix}-2 & 7\\1 & 4\end{bmatrix}$$

(ii)

$$C + B = \begin{bmatrix}0 & 0\\0 & 0\end{bmatrix}$$
$$C = \begin{bmatrix}0 & 0\\0 & 0\end{bmatrix} - B$$
$$C = \begin{bmatrix}0 & 0\\0 & 0\end{bmatrix} - \begin{bmatrix}-4 & -1\\-3 & -2\end{bmatrix}$$
$$C = \begin{bmatrix}4 & 1\\3 & 2\end{bmatrix}$$