Algebra of Matrices Ex 5.1 Q12

Given,

$$\begin{bmatrix} x & 3x-y \\ 2x+z & 3y-w \end{bmatrix} = \begin{bmatrix} 3 & 2 \\ 4 & 7 \end{bmatrix}$$

Since corresponding entries of equal matrices are equal, So

$x = 3$ ---(i)

$3x - y = 2$ ---(ii)

$2x + z = 4$ ---(iii)

$3y - w = 7$ ---(iv)

Put the value of $x = 3$ from equation on (i) in eqation (ii),

$3x - y = 2$

$3(3) - y = 2$

$9 - y = 2$

$y = 9 - 2$

$y = 7$

Put the value of $y = 7$ in equation (iv),

$3y - w = 7$

$3(7) - w = 7$

$w = 21 - 7$

$w = 14$

Put the value of $x = 3$ in equation (iii),

$2x + z = 4$

$2(3) + z = 4$

$6 + z = 4$

$z = 4 - 6$

$z = -2$

Hence,

$x = 3, y = 7, z = -2, w = 14$

Algebra of Matrices Ex 5.1 Q13

Given,

$$\begin{bmatrix} x-y & z \\ 2x-y & w \end{bmatrix} = \begin{bmatrix} -1 & 4 \\ 0 & 5 \end{bmatrix}$$

Since corresponding entries of equal matrices are equal, So

$x - y = -1$ ---(i)

$z = 4$ ---(ii)

$2x - y = 0$ ---(iii)

$w = 5$ ---(iv)

Solving equation (i) and (iii)

$$\begin{array}{l} x - y = -1 \\ 2x - y = 0 \\ \underline{(-)\quad(+)\quad(-)} \\ -x = -1 \\ x = 1 \end{array}$$

Put $x = 1$ in equation (i),

$x - y = -1$

$1 - y = -1$

$-y = -1 - 1$

$-y = -2$

$y = 2$

equation (ii) and (iv) give the values of z and w respectively, so

$z = 4, \quad w = 5$

Hence,

$x = 1, y = 2, z = 4, w = 5$

Algebra of Matrices Ex 5.1 Q14

By the definition of equality of matrices we know that if two matrices $A = [a_{ij}]_{m\times n}$ and $B = [b_{ij}]_{m\times n}$ are equal then $a_{ij} = b_{ij}$ for i = 1,2,3.....m and j = 1,2,3.....n.

Given that $\begin{bmatrix} x+3 & z+4 & 2y-7 \\ 4x+6 & a-1 & 0 \\ b-3 & 3b & z+2c \end{bmatrix} = \begin{bmatrix} 0 & 6 & 3y-2 \\ 2x & -3 & 2c+2 \\ 2b+4 & -21 & 0 \end{bmatrix}$

$\therefore$ Equating the entries gives:

$x + 3 = 0, \quad z + 4 = 6$ and $2y - 7 = 3y - 2$

$\Rightarrow \quad x = -3, \; z = 2$ and $2y - 3y = -2 + 7$

$\Rightarrow \quad x = -3, \; z = 2$ and $-y = 5$

$\Rightarrow \quad x = -3, \; z = 2$ and $y = -5$

Similarly, $a - 1 = -3$ and $2c + 2 = 0$

$\Rightarrow \quad a = -3 + 1$ and $2c = -2$

$\Rightarrow \quad a = -2$ and $c = -1$

Lastly, $b - 3 = 2b + 4$

$\Rightarrow \quad b - 2b = 4 + 3$

$\Rightarrow \quad -b = 7$

$\Rightarrow \quad b = -7$

The values of x, y, z, a, b, c are - 3, - 5 , 2 , -2 , - 7 , - 1 respectively.

Algebra of Matrices Ex 5.1 Q15

Given that $\begin{bmatrix} 2x+1 & 5x \\ 0 & y^2+1 \end{bmatrix} = \begin{bmatrix} x+3 & 10 \\ 0 & 26 \end{bmatrix}$

The corresponding entries of the equal matrices are equal.

$\Rightarrow \quad 2x + 1 = x + 3 \, , \; y^2 + 1 = 26 \, ,$

$\Rightarrow \quad 2x - x = 2 \, , \; y^2 = 25$

$\Rightarrow \quad x = 2 \, , \; y = \pm 5$

$\Rightarrow \quad x = 2 \, , y = 5 \;$ or $x = 2 \, , \; y = -5$

$\therefore \; x + y = 7$ or $- 3$

********** END **********