

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

$$x = 3$$

$$3x - y = 2$$

$$2x + z = 4$$

Put the value of x = 3 from equation on (i) in equation(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)

$$x - y = -1$$

$$2x - y = 0$$

$$(-) (+) (-)$$

$$- x = -1$$

$$x = 1$$

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

$$z = 4$$
, $w = 5$

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 $A = \begin{bmatrix} a_{ij} \end{bmatrix}_{m \times n}$ and $B = \begin{bmatrix} b_{ij} \end{bmatrix}_{m \times n}$ are equal then $a_{ii} = b_{ii}$ for $i = 1, 2, 3, \ldots, m$ and $j = 1, 2, 3, \ldots, n$.

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

: Equating the entries gives:

$$x + 3 = 0$$
, $z + 4 = 6$ and $2y - 7 = 3y - 2$
 $\Rightarrow x = -3$, $z = 2$ and $2y - 3y = -2 + 7$
 $\Rightarrow x = -3$, $z = 2$ and $y = -5$

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

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

 $\Rightarrow b - 2b = 4 + 3$
 $\Rightarrow -b = 7$

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.

$$\Rightarrow$$
 2x + 1 = x + 3, y² + 1 = 26,

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

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

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

$$x + y = 7 \text{ or } -3$$

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