Algebra of Matrices Ex 5.1 Q8

Given,

$$\begin{bmatrix} 3x + 4y & 2 & x - 2y \\ a + b & 2a - b & -1 \end{bmatrix} = \begin{bmatrix} 2 & 2 & 4 \\ 5 & -5 & -1 \end{bmatrix}$$

Since corresponding entries of equal matrix are equal.
So,

$3x + 4y = 2$ --- (i)

$x - 2y = 4$ --- (ii)

$a + b = 5$ --- (iii)

$2a - b = -5$ --- (iv)

Solving equation (i) and (iii)

$$3x - 4y = 2$$
$$\underline{3x - 6y = 12}$$
$$(-) \quad (+) \quad (-)$$
$$10y = -10$$
$$y = \frac{-10}{10} = -1$$

Put $y = 1$ in equation (ii)

$$x - 2y = 4$$
$$x - 2(-1) = 4$$
$$x = 4 - 2$$
$$x = 2$$

Now, solving equation (iii) and (iv),

$$2a + 2b = 10$$
$$\underline{2a - b = -5}$$
$$(-) \quad (+) \quad (+)$$
$$3b = 15$$
$$b = \frac{15}{3}$$
$$b = 5$$

Put the value of b in equation of (iii)

$$a + b = 5$$
$$a + 5 = 5$$
$$a = 5 - 5$$
$$a = 0$$

Hence,

$$x = 2, \ y = -1, \ a = 0, \ b = 5$$

Algebra of Matrices Ex 5.1 Q9

Given,

$$\begin{bmatrix} 2x - 3y & a - b & 3 \\ 1 & x + 4y & 3a + 4b \end{bmatrix} = \begin{bmatrix} 1 & -2 & 3 \\ 1 & 6 & 29 \end{bmatrix}$$

Since corresponding entries of equal matrix are equal.
So,

$2x - 3y = 1$	--- (i)
$x - b = -2$	--- (ii)
$x - 4y = 6$	--- (iii)
$3a + 4b = 29$	--- (iv)

Solving equation (i) and (iii)

$$2x - 3y = 1$$
$$2x - 8y = 12$$
$$\underset{(-) \quad (-) \quad (-)}{}$$
$$-11y = -11$$
$$y = \frac{-11}{-11}$$
$$y = 1$$

Put the value of y in equation (i),

$$2x - 3y = 1$$
$$2x - 3(1) = 1$$
$$2x - 3 = 1$$
$$2x = 1 + 3$$
$$2x = 4$$
$$x = 2$$

Solving equation (ii) and (iv)

$$4a - 4b = -8$$
$$\underline{3a - 4b = 29}$$
$$7a \qquad = 21$$
$$a = \frac{21}{7}$$
$$a = 3$$

Put $a = 3$ in equation (ii),

$$3 - b = -2$$
$$b = 3 + 2$$
$$b = 5$$

Hence,

$$x = 2, \; y = 1, \; a = 3, \; b = 5$$

Algebra of Matrices Ex 5.1 Q10

As the given matrices are equal, therefore their corresponding elements must be equal.

Comparing the corresponding elements, we get

$2a + b = 4$ ----(i)

$a - 2b = -3$ ----(ii)

$5c - d = 11$ ----(iii)

$4c + 3d = 24$ ----(iv)

Multiplying (i) by 2 and adding to (ii)

$5a = 5 \Rightarrow a = 1$

$(i) \Rightarrow b = 4 - 2.1 = 2$

Multiplying (iii) by 3 and adding to (iv)

$19c = 57 \Rightarrow c = 3$

$(iii) \Rightarrow d = 5.3 - 11 = 4$

Hence, $a = 1, b = 2, c = 3, d = 4$

Algebra of Matrices Ex 5.1 Q11

Given,

$$A = B$$

$$\begin{bmatrix} x - 2 & 3 & 2z \\ 18z & y + 2 & 6z \end{bmatrix} = \begin{bmatrix} y & z & 6 \\ 6y & x & 2y \end{bmatrix}$$

Since corresponding entries of equal matrices are equal, So

$x - 2 = y$ ---(i)

$3 = z$ ---(ii)

$2z = 6$ ---(iii)

$18z = 6$ ---(iv)

$y + 2 = x$ ---(v)

$6z = 2y$ ---(vi)

Equation (ii) gives, $z = 3$

Put the value of z in equal (iv),

$18z = 6y$

$18(3) = 6y$

$54 = 6y$

$y = \dfrac{54}{6}$

$y = 9$

Put $y = 9$ in equation (v)

$y + 2 = x$

$9 + 2 = x$

$11 = x$

Hence,

$x = 11, y = 9, z = 3$

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