



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,

$$3x + 4y = 2 \quad \text{--- (i)}$$

$$x - 2y = 4 \quad \text{--- (ii)}$$

$$a + b = 5 \quad \text{--- (iii)}$$

$$2a - b = -5 \quad \text{--- (iv)}$$

Solving equation (i) and (ii)

$$3x - 4y = 2$$

$$\begin{array}{r} 3x - 6y = 12 \\ (-) \quad (+) \quad (-) \end{array}$$

$$10y = -10$$

$$y = \frac{-10}{10} = -1$$

Put $y = -1$ in equation (ii)

$$x - 2y = 4$$

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

$$x = 4 - 2$$

$$x = 2$$

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

$$2a + 2b = 10$$

$$\begin{array}{r} 2a - b = -5 \\ (-) \quad (+) \quad (+) \end{array}$$

$$3b = 15$$

$$b = \frac{15}{3}$$

$$b = 5$$

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,

$$2x - 3y = 1 \quad \text{--- (i)}$$

$$x - b = -2 \quad \text{--- (ii)}$$

$$x + 4y = 6 \quad \text{--- (iii)}$$

$$3a + 4b = 29 \quad \text{--- (iv)}$$

Solving equation (i) and (iii)

$$2x - 3y = 1$$

$$\begin{array}{r} 2x - 8y = 12 \\ (-) \quad (-) \quad (-) \end{array}$$

$$-11y = -11$$

$$y = \frac{-11}{-11}$$

$$y = 1$$

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)

$$4a - 4b = -8$$

$$3a - 4b = 29$$

$$7a = 21$$

$$a = \frac{21}{7}$$

$$a = 3$$

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

$$3 - b = -2$$

$$b = 3 + 2$$

$$b = 5$$

Hence,

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

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

Comparing the corresponding elements, we get

$$2a + b = 4 \quad \text{--- (i)}$$

$$a - 2b = -3 \quad \text{--- (ii)}$$

$$5c - d = 11 \quad \text{--- (iii)}$$

$$4c + 3d = 24 \quad \text{--- (iv)}$$

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

$$x - 2 = y \quad \text{--- (i)}$$

$$3 = z \quad \text{--- (ii)}$$

$$2z = 6 \quad \text{--- (iii)}$$

$$18z = 6 \quad \text{--- (iv)}$$

$$y + 2 = x \quad \text{--- (v)}$$

$$6z = 2y \quad \text{--- (vi)}$$

Equation (ii) gives, $z = 3$

Put the value of z in equal (iv),

$$18z = 6y$$

$$18(3) = 6y$$

$$54 = 6y$$

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

$$y = 9$$

Put $y = 9$ in equation (v)

$$y + 2 = x$$

$$9 + 2 = x$$

$$11 = x$$

Hence,

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

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