Exercise 1.1

Q1. Find the order of the following matrices.

A = $\begin{bmatrix} 2 & 3 \\ -5 & 6 \end{bmatrix}$, **B** = $\begin{bmatrix} 2 & 0 \\ 3 & 5 \end{bmatrix}$, **C** = $\begin{bmatrix} 2 & 4 \end{bmatrix}$,

D = $\begin{bmatrix} 4 \\ 0 \\ 6 \end{bmatrix}$, **E** = $\begin{bmatrix} a & d \\ b & e \\ c & f \end{bmatrix}$, **F** = $\begin{bmatrix} 2 \end{bmatrix}$,

G = $\begin{bmatrix} 2 & 3 & 0 \\ 1 & 2 & 3 \\ 2 & 4 & 5 \end{bmatrix}$, **H** = $\begin{bmatrix} 2 & 3 & 4 \\ 1 & 0 & 6 \end{bmatrix}$

Solution:

Order of the *Matrix*:

The number of rows and columns in a Matrix specifies its order.

Ans (i) Matrix A has two rows and two columns
So, its order = number of rows x number of columns = 2-by-2.

Ans. (ii) Matrix B has two rows and two columns
So, its order = number of rows x number of columns = 2-by-2.

Ans. (iii) Matrix C has one row and two columns
So, its order = number of rows x number of columns = 1-by-2.

Ans. (iv) Matrix D has three rows and one column
So, its order = number of rows x number of columns = 3-by-1.

Ans. (v) Matrix E has three rows and two columns
So, its order = number of rows x number of columns = 3-by-2.

Ans. (vi) Matrix F has one row and one column
So, its order = number of rows x number of columns = 1-by-1.

Ans. (vii) Matrix G has three rows and three columns
So, its order = number of rows x number of columns = 3-by-3.

Ans. (viii) Matrix A has two rows and three columns
So, its order = number of rows x number of columns = 2-by-3.

Q2. Which of the following matrices are equal?

A = $\begin{bmatrix} 3 \end{bmatrix}$, **B** = $\begin{bmatrix} 3 & 5 \end{bmatrix}$, **C** = $\begin{bmatrix} 5 & -2 \end{bmatrix}$,

D = $\begin{bmatrix} 5 & 3 \end{bmatrix}$, **E** = $\begin{bmatrix} 4 & 0 \\ 6 & 2 \end{bmatrix}$, **F** = $\begin{bmatrix} 2 \\ 6 \end{bmatrix}$,

G = $\begin{bmatrix} 3-1 \\ 3+3 \end{bmatrix}$, **H** = $\begin{bmatrix} 4 & 0 \\ 6 & 2 \end{bmatrix}$, **I** = $\begin{bmatrix} 3 & 3+2 \end{bmatrix}$,

J = $\begin{bmatrix} 2+2 & 2-2 \\ 2+4 & 2+0 \end{bmatrix}$

Solution:

Solving C

C = $\begin{bmatrix} 5 & -2 \end{bmatrix}$

C = $\begin{bmatrix} 3 \end{bmatrix}$

Solving G

G = $\begin{bmatrix} 3-1 \\ 3+3 \end{bmatrix}$

G = $\begin{bmatrix} 2 \\ 6 \end{bmatrix}$

Solving I

I = $\begin{bmatrix} 3 & 3+2 \end{bmatrix}$

I = $\begin{bmatrix} 3 & 5 \end{bmatrix}$

Solving J

J = $\begin{bmatrix} 2+2 & 2-2 \\ 2+4 & 2+0 \end{bmatrix}$

J = $\begin{bmatrix} 4 & 0 \\ 6 & 2 \end{bmatrix}$

Now

Matrices are said to be equal if

(i) They are of same order
(ii) Their corresponding values are equal

So, according to this definition

Ans. (a) Matrices A and C are equal, A = C.
(b) Matrices B and I are equal, B = I.
(c) Matrices E, H and J are equal, E = H = J.
(d) Matrices F and G are equal, F = G.

Q3. Find the values of a, b, c, and d which satisfy the matrix equation.

$$\begin{bmatrix} a+c & a+2b \\ c-1 & 4d-6 \end{bmatrix} = \begin{bmatrix} 0 & -7 \\ 3 & 2d \end{bmatrix}$$

Solution:

As, $\begin{bmatrix} a+c & a+2b \\ c-1 & 4d-6 \end{bmatrix} = \begin{bmatrix} 0 & -7 \\ 3 & 2d \end{bmatrix}$

By comparing the corresponding elements

So, a + c = 0
a = − c ----------(i)

a + 2b = − 7
2b = − (a+7) ----------(ii)

c − 1 = 3
c = 3 + 1
c = 4 ----------(iii)

By putting the value of "c" in equation (i), we will get
a = −4 ----------(iv)

By putting the value of "a" in equation (ii), we will get
2b = − (− 4+7)
2b = − (3)
b = − 3/2
b = − 1.5 ----------(v)

Similarly,
4d − 6 = 2d
4d − 2d = 6
2d = 6
d = 6/2
d = 3 ----------(vi)

From equations (iii), (iv), (v) and (vi) we get
a = − 4,
b = − 1.5,
c = 4
d = 3

Exercise 1.2

Q1. From the following matrices, identity unit matrices, row matrices, column matrices and null matrices.

A = $\begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$, **B =** $\begin{bmatrix} 2 & 3 & 4 \end{bmatrix}$, **C =** $\begin{bmatrix} 4 \\ 0 \\ 6 \end{bmatrix}$,

D = $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$, **E =** $\begin{bmatrix} 0 \end{bmatrix}$, **F =** $\begin{bmatrix} 5 \\ 6 \\ 7 \end{bmatrix}$

Solution:

Matrix A is a null matrix (because all its entries are zero)

Matrix B is a row matrix (because it has only one row).

Matrix C is a column matrix (because it has only one column).

Matrix D is a unit matrix (because its diagonal entries are 1 and non-diagonal entries are 0).

Matrix E is a null matrix (because all its entries are 0).

Matrix F is a column matrix (because it has only one column).

Q2. From the following matrices, identify

(a) Square matrices **(b) Rectangular matrices**
(c) Row matrices **(d) Column matrices**
(e) Identity matrices **(f) Null matrices**

(i) $\begin{bmatrix} -8 & 2 & 7 \\ 12 & 0 & 4 \end{bmatrix}$, **(ii)** $\begin{bmatrix} 3 \\ 0 \\ 1 \end{bmatrix}$, **(iii)** $\begin{bmatrix} 6 & -4 \\ 3 & -2 \end{bmatrix}$,

(iv) $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$, **(v)** $\begin{bmatrix} 1 & 2 \\ 3 & 4 \\ 5 & 6 \end{bmatrix}$, **(vi)** $\begin{bmatrix} 3 & 10 & -1 \end{bmatrix}$,

(vii) $\begin{bmatrix} 1 \\ 0 \\ 0 \end{bmatrix}$, **(viii)** $\begin{bmatrix} 1 & 2 & 3 \\ -1 & 2 & 0 \\ 0 & 0 & 1 \end{bmatrix}$ **(ix)** $\begin{bmatrix} 0 & 0 \\ 0 & 0 \\ 0 & 0 \end{bmatrix}$

Solution:

(a) (iii), (iv) and (viii) are square matrices because the number of rows are equal to number of columns.

(b) (i), (ii), (v), (vi) (vii), (ix) are rectangular matrices because their rows and columns are not equal.

(c) (vi) is a row matrix because it has only one row.

(d) (ii) and (vii) are column matrices because they have only one column.

(e) (iv) is an identity matrix as well because its diagonal elements are "1" and all non-diagonal elements are zero.

(f) (ix) is a null matrix because its each entry is zero.

Q3. From the following matrices identify diagonal, scalar and unit (identity) matrices.

A = $\begin{bmatrix} 4 & 0 \\ 0 & 4 \end{bmatrix}$, **B =** $\begin{bmatrix} 2 & 0 \\ 0 & -1 \end{bmatrix}$, **C =** $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$,

D = $\begin{bmatrix} 3 & 0 \\ 0 & 0 \end{bmatrix}$, **E =** $\begin{bmatrix} 5-3 & 0 \\ 0 & 1+1 \end{bmatrix}$

Solution:

Matrix A is a scalar matrix (because its diagonal entries are same).

Matrix B is a diagonal matrix (because its diagonal entries are non-zero and non-diagonal entities are zero).

Matrix C is an identity matrix (because its diagonal entries are 1).

Matrix D is a diagonal matrix (because its one diagonal entry is non-zero and non-diagonal entities are zero).

Matrix E is a scalar matrix (because its diagonal entries are same).

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

$E = \begin{bmatrix} 2 & 0 \\ 0 & 2 \end{bmatrix}$

(Note that all the matrices A, B, C, D and E are diagonal matrices because they have at least one non-zero diagonal entry and all their non-diagonal entries are zero.

Scalar and unit matrices are further types of diagonal matrices.**)**

Q4. Find negative of matrices A, B, C, D and E when:

A = $\begin{bmatrix} 1 \\ 0 \\ -1 \end{bmatrix}$, **B =** $\begin{bmatrix} 3 & -1 \\ 2 & 1 \end{bmatrix}$, **C =** $\begin{bmatrix} 2 & 6 \\ 3 & 2 \end{bmatrix}$,

D = $\begin{bmatrix} -3 & 2 \\ -4 & 5 \end{bmatrix}$, **E =** $\begin{bmatrix} 1 & -5 \\ 2 & 3 \end{bmatrix}$

Solution:

Negative of a matrix is obtained by inverting (changing) the signs of all its entries.

So,

(i) $-A = \begin{bmatrix} -1 \\ 0 \\ 1 \end{bmatrix}$ **(ii)** $-B = \begin{bmatrix} -3 & 1 \\ -2 & -1 \end{bmatrix}$

(iii) $-C = \begin{bmatrix} -2 & -6 \\ -3 & -2 \end{bmatrix}$ **(iv)** $-D = \begin{bmatrix} 3 & -2 \\ 4 & -5 \end{bmatrix}$

(v) $-E = \begin{bmatrix} -1 & 5 \\ -2 & -3 \end{bmatrix}$

Q5. Find the transpose of each of the following matrices:

A = $\begin{bmatrix} 0 \\ 1 \\ -2 \end{bmatrix}$, **B =** $\begin{bmatrix} 5 & 1 & -6 \end{bmatrix}$, **C =** $\begin{bmatrix} 1 & 2 \\ 2 & -1 \\ 3 & 0 \end{bmatrix}$,

D = $\begin{bmatrix} 2 & 3 \\ 0 & 5 \end{bmatrix}$, **E =** $\begin{bmatrix} 2 & 3 \\ -4 & 5 \end{bmatrix}$, **F =** $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$

Solution:

Transpose of a matrix is obtained by converting all the columns of that matrix to the rows and all the rows to the columns.

So, according to the definition;

(i) $A^T = \begin{bmatrix} 0 & 1 & -2 \end{bmatrix}$ **(ii)** $B^T = \begin{bmatrix} 5 \\ 1 \\ -6 \end{bmatrix}$

(iii) $C^T = \begin{bmatrix} 1 & 2 & 3 \\ 2 & -1 & 0 \end{bmatrix}$ **(iv)** $D^T = \begin{bmatrix} 2 & 0 \\ 3 & 5 \end{bmatrix}$

(v) $E^T = \begin{bmatrix} 2 & -4 \\ 3 & 5 \end{bmatrix}$ **(vi)** $F^T = \begin{bmatrix} 1 & 3 \\ 2 & 4 \end{bmatrix}$

Q6. Verify that if A = $\begin{bmatrix} 1 & 2 \\ 0 & 1 \end{bmatrix}$ **, B =** $\begin{bmatrix} 1 & 1 \\ 2 & 0 \end{bmatrix}$ **then**

(i) $(A^T)^T = A$ **(ii) $(B^T)^T = B$**

Solution:

(i) To prove: $(A^T)^T = A$

Given $A = \begin{bmatrix} 1 & 2 \\ 0 & 1 \end{bmatrix}$

$A^T = \begin{bmatrix} 1 & 0 \\ 2 & 1 \end{bmatrix}$

Taking transpose of A^T, we will get

$(A^T)^T = \begin{bmatrix} 1 & 2 \\ 0 & 1 \end{bmatrix} = A$

Hence proved: **$(A^T)^T = A$**

(ii) To prove: $(B^T)^T = B$

Given $B = \begin{bmatrix} 1 & 1 \\ 2 & 0 \end{bmatrix}$

$B^T = \begin{bmatrix} 1 & 2 \\ 1 & 0 \end{bmatrix}$

Taking transpose of B^T, we will get

$(B^T)^T = \begin{bmatrix} 1 & 1 \\ 2 & 0 \end{bmatrix} = B$

Hence proved: **$(B^T)^T = B$**

Practice 7.3

Exercise 1

Find the indicated sum of the given matrices.

1. $\begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix} + \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$

Solution

$$\begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix} + \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} = \begin{bmatrix} 2+1 & 3+2 \\ 4+3 & 5+4 \end{bmatrix}$$

$$= \begin{bmatrix} 3 & 5 \\ 7 & 9 \end{bmatrix}$$

Exercise 2

Find the indicated sum of the given matrices.

2. $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} + \begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix}$

Solution

$$\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} + \begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix} = \begin{bmatrix} 1+2 & 2+3 \\ 3+4 & 4+5 \end{bmatrix}$$

$$= \begin{bmatrix} 3 & 5 \\ 7 & 9 \end{bmatrix}$$

Exercise 3

Find the indicated sum of the given matrices.

3. $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} + \begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix}$

Solution

$$\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} + \begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix} = \begin{bmatrix} 1+2 & 2+3 \\ 3+4 & 4+5 \end{bmatrix}$$

$$= \begin{bmatrix} 3 & 5 \\ 7 & 9 \end{bmatrix}$$

Exercise 4

Find the indicated sum of the given matrices.

4. $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} + \begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix}$

Solution

$$\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} + \begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix} = \begin{bmatrix} 1+2 & 2+3 \\ 3+4 & 4+5 \end{bmatrix}$$

$$= \begin{bmatrix} 3 & 5 \\ 7 & 9 \end{bmatrix}$$

Exercise 5

Find the indicated sum of the given matrices.

5. $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} + \begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix}$

Solution

$$\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} + \begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix} = \begin{bmatrix} 1+2 & 2+3 \\ 3+4 & 4+5 \end{bmatrix}$$

$$= \begin{bmatrix} 3 & 5 \\ 7 & 9 \end{bmatrix}$$

Exercise 6

Find the indicated sum of the given matrices.

6. $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} + \begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix}$

Solution

$$\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} + \begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix} = \begin{bmatrix} 1+2 & 2+3 \\ 3+4 & 4+5 \end{bmatrix}$$

$$= \begin{bmatrix} 3 & 5 \\ 7 & 9 \end{bmatrix}$$

Exercise 7

Find the indicated sum of the given matrices.

7. $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} + \begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix}$

Solution

$$\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} + \begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix} = \begin{bmatrix} 1+2 & 2+3 \\ 3+4 & 4+5 \end{bmatrix}$$

$$= \begin{bmatrix} 3 & 5 \\ 7 & 9 \end{bmatrix}$$

Exercise 8

Find the indicated sum of the given matrices.

8. $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} + \begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix}$

Solution

$$\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} + \begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix} = \begin{bmatrix} 1+2 & 2+3 \\ 3+4 & 4+5 \end{bmatrix}$$

$$= \begin{bmatrix} 3 & 5 \\ 7 & 9 \end{bmatrix}$$

Exercise 9

Find the indicated sum of the given matrices.

9. $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} + \begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix}$

Solution

$$\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} + \begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix} = \begin{bmatrix} 1+2 & 2+3 \\ 3+4 & 4+5 \end{bmatrix}$$

$$= \begin{bmatrix} 3 & 5 \\ 7 & 9 \end{bmatrix}$$

Exercise 10

Find the indicated sum of the given matrices.

10. $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} + \begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix}$

Solution

$$\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} + \begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix} = \begin{bmatrix} 1+2 & 2+3 \\ 3+4 & 4+5 \end{bmatrix}$$

$$= \begin{bmatrix} 3 & 5 \\ 7 & 9 \end{bmatrix}$$

Exercise 11

Find the indicated sum of the given matrices.

11. $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} + \begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix}$

Solution

$$\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} + \begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix} = \begin{bmatrix} 1+2 & 2+3 \\ 3+4 & 4+5 \end{bmatrix}$$

$$= \begin{bmatrix} 3 & 5 \\ 7 & 9 \end{bmatrix}$$

Exercise 12

Find the indicated sum of the given matrices.

12. $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} + \begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix}$

Solution

$$\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} + \begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix} = \begin{bmatrix} 1+2 & 2+3 \\ 3+4 & 4+5 \end{bmatrix}$$

$$= \begin{bmatrix} 3 & 5 \\ 7 & 9 \end{bmatrix}$$

Exercise 13

Find the indicated sum of the given matrices.

13. $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} + \begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix}$

Solution

$$\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} + \begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix} = \begin{bmatrix} 1+2 & 2+3 \\ 3+4 & 4+5 \end{bmatrix}$$

$$= \begin{bmatrix} 3 & 5 \\ 7 & 9 \end{bmatrix}$$

Exercise 14

Find the indicated sum of the given matrices.

14. $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} + \begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix}$

Solution

$$\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} + \begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix} = \begin{bmatrix} 1+2 & 2+3 \\ 3+4 & 4+5 \end{bmatrix}$$

$$= \begin{bmatrix} 3 & 5 \\ 7 & 9 \end{bmatrix}$$

Exercise 15

Find the indicated sum of the given matrices.

15. $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} + \begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix}$

Solution

$$\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} + \begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix} = \begin{bmatrix} 1+2 & 2+3 \\ 3+4 & 4+5 \end{bmatrix}$$

$$= \begin{bmatrix} 3 & 5 \\ 7 & 9 \end{bmatrix}$$

Exercise 16

Find the indicated sum of the given matrices.

16. $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} + \begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix}$

Solution

$$\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} + \begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix} = \begin{bmatrix} 1+2 & 2+3 \\ 3+4 & 4+5 \end{bmatrix}$$

$$= \begin{bmatrix} 3 & 5 \\ 7 & 9 \end{bmatrix}$$

Exercise 17

Find the indicated sum of the given matrices.

17. $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} + \begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix}$

Solution

$$\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} + \begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix} = \begin{bmatrix} 1+2 & 2+3 \\ 3+4 & 4+5 \end{bmatrix}$$

$$= \begin{bmatrix} 3 & 5 \\ 7 & 9 \end{bmatrix}$$

Exercise 18

Find the indicated sum of the given matrices.

18. $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} + \begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix}$

Solution

$$\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} + \begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix} = \begin{bmatrix} 1+2 & 2+3 \\ 3+4 & 4+5 \end{bmatrix}$$

$$= \begin{bmatrix} 3 & 5 \\ 7 & 9 \end{bmatrix}$$

Exercise 19

Find the indicated sum of the given matrices.

19. $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} + \begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix}$

Solution

$$\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} + \begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix} = \begin{bmatrix} 1+2 & 2+3 \\ 3+4 & 4+5 \end{bmatrix}$$

$$= \begin{bmatrix} 3 & 5 \\ 7 & 9 \end{bmatrix}$$

Exercise 20

Find the indicated sum of the given matrices.

20. $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} + \begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix}$

Solution

$$\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} + \begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix} = \begin{bmatrix} 1+2 & 2+3 \\ 3+4 & 4+5 \end{bmatrix}$$

$$= \begin{bmatrix} 3 & 5 \\ 7 & 9 \end{bmatrix}$$

Exercise 21

Find the indicated sum of the given matrices.

21. $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} + \begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix}$

Solution

$$\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} + \begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix} = \begin{bmatrix} 1+2 & 2+3 \\ 3+4 & 4+5 \end{bmatrix}$$

$$= \begin{bmatrix} 3 & 5 \\ 7 & 9 \end{bmatrix}$$

Exercise 22

Find the indicated sum of the given matrices.

22. $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} + \begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix}$

Solution

$$\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} + \begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix} = \begin{bmatrix} 1+2 & 2+3 \\ 3+4 & 4+5 \end{bmatrix}$$

$$= \begin{bmatrix} 3 & 5 \\ 7 & 9 \end{bmatrix}$$

Exercise 23

Find the indicated sum of the given matrices.

23. $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} + \begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix}$

Solution

$$\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} + \begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix} = \begin{bmatrix} 1+2 & 2+3 \\ 3+4 & 4+5 \end{bmatrix}$$

$$= \begin{bmatrix} 3 & 5 \\ 7 & 9 \end{bmatrix}$$

Exercise 24

Find the indicated sum of the given matrices.

24. $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} + \begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix}$

Solution

$$\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} + \begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix} = \begin{bmatrix} 1+2 & 2+3 \\ 3+4 & 4+5 \end{bmatrix}$$

$$= \begin{bmatrix} 3 & 5 \\ 7 & 9 \end{bmatrix}$$

Exercise 25

Find the indicated sum of the given matrices.

25. $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} + \begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix}$

Solution

$$\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} + \begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix} = \begin{bmatrix} 1+2 & 2+3 \\ 3+4 & 4+5 \end{bmatrix}$$

$$= \begin{bmatrix} 3 & 5 \\ 7 & 9 \end{bmatrix}$$

Exercise 26

Find the indicated sum of the given matrices.

26. $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} + \begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix}$

Solution

$$\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} + \begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix} = \begin{bmatrix} 1+2 & 2+3 \\ 3+4 & 4+5 \end{bmatrix}$$

$$= \begin{bmatrix} 3 & 5 \\ 7 & 9 \end{bmatrix}$$

Exercise 27

Find the indicated sum of the given matrices.

27. $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} + \begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix}$

Solution

$$\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} + \begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix} = \begin{bmatrix} 1+2 & 2+3 \\ 3+4 & 4+5 \end{bmatrix}$$

$$= \begin{bmatrix} 3 & 5 \\ 7 & 9 \end{bmatrix}$$

Exercise 28

Find the indicated sum of the given matrices.

28. $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} + \begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix}$

Solution

$$\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} + \begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix} = \begin{bmatrix} 1+2 & 2+3 \\ 3+4 & 4+5 \end{bmatrix}$$

$$= \begin{bmatrix} 3 & 5 \\ 7 & 9 \end{bmatrix}$$

Exercise 29

Find the indicated sum of the given matrices.

29. $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} + \begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix}$

Solution

$$\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} + \begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix} = \begin{bmatrix} 1+2 & 2+3 \\ 3+4 & 4+5 \end{bmatrix}$$

$$= \begin{bmatrix} 3 & 5 \\ 7 & 9 \end{bmatrix}$$

Exercise 30

Find the indicated sum of the given matrices.

30. $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} + \begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix}$

Solution

$$\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} + \begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix} = \begin{bmatrix} 1+2 & 2+3 \\ 3+4 & 4+5 \end{bmatrix}$$

$$= \begin{bmatrix} 3 & 5 \\ 7 & 9 \end{bmatrix}$$

Exercise 31

Find the indicated sum of the given matrices.

31. $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} + \begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix}$

Solution

$$\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} + \begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix} = \begin{bmatrix} 1+2 & 2+3 \\ 3+4 & 4+5 \end{bmatrix}$$

$$= \begin{bmatrix} 3 & 5 \\ 7 & 9 \end{bmatrix}$$

Exercise 32

Find the indicated sum of the given matrices.

32. $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} + \begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix}$

Solution

$$\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} + \begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix} = \begin{bmatrix} 1+2 & 2+3 \\ 3+4 & 4+5 \end{bmatrix}$$

$$= \begin{bmatrix} 3 & 5 \\ 7 & 9 \end{bmatrix}$$

Exercise 33

Find the indicated sum of the given matrices.

33. $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} + \begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix}$

Solution

$$\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} + \begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix} = \begin{bmatrix} 1+2 & 2+3 \\ 3+4 & 4+5 \end{bmatrix}$$

$$= \begin{bmatrix} 3 & 5 \\ 7 & 9 \end{bmatrix}$$

Exercise 34

Find the indicated sum of the given matrices.

34. $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} + \begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix}$

Solution

$$\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} + \begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix} = \begin{bmatrix} 1+2 & 2+3 \\ 3+4 & 4+5 \end{bmatrix}$$

$$= \begin{bmatrix} 3 & 5 \\ 7 & 9 \end{bmatrix}$$

Exercise 35

Find the indicated sum of the given matrices.

35. $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} + \begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix}$

Solution

$$\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} + \begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix} = \begin{bmatrix} 1+2 & 2+3 \\ 3+4 & 4+5 \end{bmatrix}$$

$$= \begin{bmatrix} 3 & 5 \\ 7 & 9 \end{bmatrix}$$

Exercise 36

Find the indicated sum of the given matrices.

36. $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} + \begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix}$

Solution

$$\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} + \begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix} = \begin{bmatrix} 1+2 & 2+3 \\ 3+4 & 4+5 \end{bmatrix}$$

$$= \begin{bmatrix} 3 & 5 \\ 7 & 9 \end{bmatrix}$$

Exercise 37

Find the indicated sum of the given matrices.

37. $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} + \begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix}$

Solution

$$\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} + \begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix} = \begin{bmatrix} 1+2 & 2+3 \\ 3+4 & 4+5 \end{bmatrix}$$

$$= \begin{bmatrix} 3 & 5 \\ 7 & 9 \end{bmatrix}$$

Exercise 38

Find the indicated sum of the given matrices.

38. $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} + \begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix}$

Solution

$$\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} + \begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix} = \begin{bmatrix} 1+2 & 2+3 \\ 3+4 & 4+5 \end{bmatrix}$$

$$= \begin{bmatrix} 3 & 5 \\ 7 & 9 \end{bmatrix}$$

Exercise 39

Find the indicated sum of the given matrices.

39. $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} + \begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix}$

Solution

$$\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} + \begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix} = \begin{bmatrix} 1+2 & 2+3 \\ 3+4 & 4+5 \end{bmatrix}$$

$$= \begin{bmatrix} 3 & 5 \\ 7 & 9 \end{bmatrix}$$

Exercise 40

Find the indicated sum of the given matrices.

40. $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} + \begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix}$

Solution

$$\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} + \begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix} = \begin{bmatrix} 1+2 & 2+3 \\ 3+4 & 4+5 \end{bmatrix}$$

$$= \begin{bmatrix} 3 & 5 \\ 7 & 9 \end{bmatrix}$$

Exercise 1.4

(1) **Which of the following product of matrices is conformable for multiplication?**

(A) $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} \begin{bmatrix} 5 & 6 \\ 7 & 8 \end{bmatrix}$ **(B)** $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} \begin{bmatrix} 5 & 6 \\ 7 & 8 \end{bmatrix}$

(C) $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} \begin{bmatrix} 5 & 6 \\ 7 & 8 \end{bmatrix}$ **(D)** $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} \begin{bmatrix} 5 & 6 \\ 7 & 8 \end{bmatrix}$

Solution:

Matrix multiplication is conformable for multiplication if the number of columns in the first matrix are equal to the number of rows of second matrix.

So, according to this definition

(A) is conformable for multiplication (because the first matrix has two columns and second matrix has same number of rows)

(B) is conformable for multiplication (because the first matrix has two columns and second matrix has same number of rows)

(C) is not conformable for multiplication (because the first matrix has just one column and second matrix has two rows)

(D) is conformable for multiplication (because the first matrix has just two columns and second matrix has also same number of rows)

(2) is conformable for multiplication (because the first matrix has three columns and second matrix has same number of rows)

(A) $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} \begin{bmatrix} 5 & 6 \\ 7 & 8 \end{bmatrix}$ **(B)** $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} \begin{bmatrix} 5 & 6 \\ 7 & 8 \end{bmatrix}$

(C) $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} \begin{bmatrix} 5 & 6 \\ 7 & 8 \end{bmatrix}$ **(D)** $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} \begin{bmatrix} 5 & 6 \\ 7 & 8 \end{bmatrix}$

Solution:

(A) $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} \begin{bmatrix} 5 & 6 \\ 7 & 8 \end{bmatrix}$

- $\begin{bmatrix} 1 \times 5 & 1 \times 6 \\ 3 \times 5 & 3 \times 6 \end{bmatrix}$
- $\begin{bmatrix} 5 & 6 \\ 15 & 18 \end{bmatrix}$

(B) $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} \begin{bmatrix} 5 & 6 \\ 7 & 8 \end{bmatrix}$

- $\begin{bmatrix} 2 \times 5 & 2 \times 6 \\ 4 \times 5 & 4 \times 6 \end{bmatrix}$
- $\begin{bmatrix} 10 & 12 \\ 20 & 24 \end{bmatrix}$

(C) $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} \begin{bmatrix} 5 & 6 \\ 7 & 8 \end{bmatrix}$

- $\begin{bmatrix} 1 \times 5 & 2 \times 6 \\ 3 \times 5 & 4 \times 6 \end{bmatrix}$
- $\begin{bmatrix} 5 & 12 \\ 15 & 24 \end{bmatrix}$

(D) $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} \begin{bmatrix} 5 & 6 \\ 7 & 8 \end{bmatrix}$

- $\begin{bmatrix} 1 \times 5 & 2 \times 6 \\ 3 \times 5 & 4 \times 6 \end{bmatrix}$
- $\begin{bmatrix} 5 & 12 \\ 15 & 24 \end{bmatrix}$

(3) **Find the following product**

(A) $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ **(B)** $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$

(C) $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ **(D)** $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$

Solution:

(A) $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$

- $\begin{bmatrix} 1 \times 1 & 1 \times 2 \\ 3 \times 1 & 3 \times 2 \end{bmatrix}$
- $\begin{bmatrix} 1 & 2 \\ 3 & 6 \end{bmatrix}$

(B) $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$

- $\begin{bmatrix} 2 \times 1 & 2 \times 2 \\ 4 \times 1 & 4 \times 2 \end{bmatrix}$
- $\begin{bmatrix} 2 & 4 \\ 4 & 8 \end{bmatrix}$

(C) $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$

- $\begin{bmatrix} 1 \times 1 & 2 \times 2 \\ 3 \times 1 & 4 \times 2 \end{bmatrix}$
- $\begin{bmatrix} 1 & 4 \\ 3 & 8 \end{bmatrix}$

(D) $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$

- $\begin{bmatrix} 1 \times 1 & 2 \times 2 \\ 3 \times 1 & 4 \times 2 \end{bmatrix}$
- $\begin{bmatrix} 1 & 4 \\ 3 & 8 \end{bmatrix}$

(4) $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} \begin{bmatrix} 5 & 6 \\ 7 & 8 \end{bmatrix}$ **(A)** $\begin{bmatrix} 19 & 22 \\ 43 & 50 \end{bmatrix}$

(B) $\begin{bmatrix} 19 & 22 \\ 43 & 50 \end{bmatrix}$ **(C)** $\begin{bmatrix} 19 & 22 \\ 43 & 50 \end{bmatrix}$

(D) $\begin{bmatrix} 19 & 22 \\ 43 & 50 \end{bmatrix}$

Solution:

(A) $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} \begin{bmatrix} 5 & 6 \\ 7 & 8 \end{bmatrix}$

- $\begin{bmatrix} 1 \times 5 + 2 \times 7 & 1 \times 6 + 2 \times 8 \\ 3 \times 5 + 4 \times 7 & 3 \times 6 + 4 \times 8 \end{bmatrix}$
- $\begin{bmatrix} 5 + 14 & 6 + 16 \\ 15 + 28 & 18 + 32 \end{bmatrix}$
- $\begin{bmatrix} 19 & 22 \\ 43 & 50 \end{bmatrix}$

(B) $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} \begin{bmatrix} 5 & 6 \\ 7 & 8 \end{bmatrix}$

- $\begin{bmatrix} 1 \times 5 + 2 \times 7 & 1 \times 6 + 2 \times 8 \\ 3 \times 5 + 4 \times 7 & 3 \times 6 + 4 \times 8 \end{bmatrix}$
- $\begin{bmatrix} 5 + 14 & 6 + 16 \\ 15 + 28 & 18 + 32 \end{bmatrix}$
- $\begin{bmatrix} 19 & 22 \\ 43 & 50 \end{bmatrix}$

(C) $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} \begin{bmatrix} 5 & 6 \\ 7 & 8 \end{bmatrix}$

- $\begin{bmatrix} 1 \times 5 + 2 \times 7 & 1 \times 6 + 2 \times 8 \\ 3 \times 5 + 4 \times 7 & 3 \times 6 + 4 \times 8 \end{bmatrix}$
- $\begin{bmatrix} 5 + 14 & 6 + 16 \\ 15 + 28 & 18 + 32 \end{bmatrix}$
- $\begin{bmatrix} 19 & 22 \\ 43 & 50 \end{bmatrix}$

(D) $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} \begin{bmatrix} 5 & 6 \\ 7 & 8 \end{bmatrix}$

- $\begin{bmatrix} 1 \times 5 + 2 \times 7 & 1 \times 6 + 2 \times 8 \\ 3 \times 5 + 4 \times 7 & 3 \times 6 + 4 \times 8 \end{bmatrix}$
- $\begin{bmatrix} 5 + 14 & 6 + 16 \\ 15 + 28 & 18 + 32 \end{bmatrix}$
- $\begin{bmatrix} 19 & 22 \\ 43 & 50 \end{bmatrix}$

(5) $\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix} \begin{bmatrix} 7 & 8 \\ 9 & 10 \\ 11 & 12 \end{bmatrix}$ **(A)** $\begin{bmatrix} 58 & 64 \\ 139 & 154 \end{bmatrix}$

(B) $\begin{bmatrix} 58 & 64 \\ 139 & 154 \end{bmatrix}$ **(C)** $\begin{bmatrix} 58 & 64 \\ 139 & 154 \end{bmatrix}$

(D) $\begin{bmatrix} 58 & 64 \\ 139 & 154 \end{bmatrix}$

Solution:

(A) $\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix} \begin{bmatrix} 7 & 8 \\ 9 & 10 \\ 11 & 12 \end{bmatrix}$

- $\begin{bmatrix} 1 \times 7 + 2 \times 9 + 3 \times 11 & 1 \times 8 + 2 \times 10 + 3 \times 12 \\ 4 \times 7 + 5 \times 9 + 6 \times 11 & 4 \times 8 + 5 \times 10 + 6 \times 12 \end{bmatrix}$
- $\begin{bmatrix} 7 + 18 + 33 & 8 + 20 + 36 \\ 28 + 45 + 66 & 32 + 50 + 72 \end{bmatrix}$
- $\begin{bmatrix} 58 & 64 \\ 139 & 154 \end{bmatrix}$

(B) $\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix} \begin{bmatrix} 7 & 8 \\ 9 & 10 \\ 11 & 12 \end{bmatrix}$

- $\begin{bmatrix} 1 \times 7 + 2 \times 9 + 3 \times 11 & 1 \times 8 + 2 \times 10 + 3 \times 12 \\ 4 \times 7 + 5 \times 9 + 6 \times 11 & 4 \times 8 + 5 \times 10 + 6 \times 12 \end{bmatrix}$
- $\begin{bmatrix} 7 + 18 + 33 & 8 + 20 + 36 \\ 28 + 45 + 66 & 32 + 50 + 72 \end{bmatrix}$
- $\begin{bmatrix} 58 & 64 \\ 139 & 154 \end{bmatrix}$

(C) $\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix} \begin{bmatrix} 7 & 8 \\ 9 & 10 \\ 11 & 12 \end{bmatrix}$

- $\begin{bmatrix} 1 \times 7 + 2 \times 9 + 3 \times 11 & 1 \times 8 + 2 \times 10 + 3 \times 12 \\ 4 \times 7 + 5 \times 9 + 6 \times 11 & 4 \times 8 + 5 \times 10 + 6 \times 12 \end{bmatrix}$
- $\begin{bmatrix} 7 + 18 + 33 & 8 + 20 + 36 \\ 28 + 45 + 66 & 32 + 50 + 72 \end{bmatrix}$
- $\begin{bmatrix} 58 & 64 \\ 139 & 154 \end{bmatrix}$

(D) $\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix} \begin{bmatrix} 7 & 8 \\ 9 & 10 \\ 11 & 12 \end{bmatrix}$

- $\begin{bmatrix} 1 \times 7 + 2 \times 9 + 3 \times 11 & 1 \times 8 + 2 \times 10 + 3 \times 12 \\ 4 \times 7 + 5 \times 9 + 6 \times 11 & 4 \times 8 + 5 \times 10 + 6 \times 12 \end{bmatrix}$
- $\begin{bmatrix} 7 + 18 + 33 & 8 + 20 + 36 \\ 28 + 45 + 66 & 32 + 50 + 72 \end{bmatrix}$
- $\begin{bmatrix} 58 & 64 \\ 139 & 154 \end{bmatrix}$

(6) $\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix} \begin{bmatrix} 7 & 8 \\ 9 & 10 \\ 11 & 12 \end{bmatrix}$ **(A)** $\begin{bmatrix} 58 & 64 \\ 139 & 154 \end{bmatrix}$

(B) $\begin{bmatrix} 58 & 64 \\ 139 & 154 \end{bmatrix}$ **(C)** $\begin{bmatrix} 58 & 64 \\ 139 & 154 \end{bmatrix}$

(D) $\begin{bmatrix} 58 & 64 \\ 139 & 154 \end{bmatrix}$

Solution:

(A) $\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix} \begin{bmatrix} 7 & 8 \\ 9 & 10 \\ 11 & 12 \end{bmatrix}$

- $\begin{bmatrix} 1 \times 7 + 2 \times 9 + 3 \times 11 & 1 \times 8 + 2 \times 10 + 3 \times 12 \\ 4 \times 7 + 5 \times 9 + 6 \times 11 & 4 \times 8 + 5 \times 10 + 6 \times 12 \end{bmatrix}$
- $\begin{bmatrix} 7 + 18 + 33 & 8 + 20 + 36 \\ 28 + 45 + 66 & 32 + 50 + 72 \end{bmatrix}$
- $\begin{bmatrix} 58 & 64 \\ 139 & 154 \end{bmatrix}$

(B) $\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix} \begin{bmatrix} 7 & 8 \\ 9 & 10 \\ 11 & 12 \end{bmatrix}$

- $\begin{bmatrix} 1 \times 7 + 2 \times 9 + 3 \times 11 & 1 \times 8 + 2 \times 10 + 3 \times 12 \\ 4 \times 7 + 5 \times 9 + 6 \times 11 & 4 \times 8 + 5 \times 10 + 6 \times 12 \end{bmatrix}$
- $\begin{bmatrix} 7 + 18 + 33 & 8 + 20 + 36 \\ 28 + 45 + 66 & 32 + 50 + 72 \end{bmatrix}$
- $\begin{bmatrix} 58 & 64 \\ 139 & 154 \end{bmatrix}$

(C) $\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix} \begin{bmatrix} 7 & 8 \\ 9 & 10 \\ 11 & 12 \end{bmatrix}$

- $\begin{bmatrix} 1 \times 7 + 2 \times 9 + 3 \times 11 & 1 \times 8 + 2 \times 10 + 3 \times 12 \\ 4 \times 7 + 5 \times 9 + 6 \times 11 & 4 \times 8 + 5 \times 10 + 6 \times 12 \end{bmatrix}$
- $\begin{bmatrix} 7 + 18 + 33 & 8 + 20 + 36 \\ 28 + 45 + 66 & 32 + 50 + 72 \end{bmatrix}$
- $\begin{bmatrix} 58 & 64 \\ 139 & 154 \end{bmatrix}$

(D) $\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix} \begin{bmatrix} 7 & 8 \\ 9 & 10 \\ 11 & 12 \end{bmatrix}$

- $\begin{bmatrix} 1 \times 7 + 2 \times 9 + 3 \times 11 & 1 \times 8 + 2 \times 10 + 3 \times 12 \\ 4 \times 7 + 5 \times 9 + 6 \times 11 & 4 \times 8 + 5 \times 10 + 6 \times 12 \end{bmatrix}$
- $\begin{bmatrix} 7 + 18 + 33 & 8 + 20 + 36 \\ 28 + 45 + 66 & 32 + 50 + 72 \end{bmatrix}$
- $\begin{bmatrix} 58 & 64 \\ 139 & 154 \end{bmatrix}$

(7) $\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix} \begin{bmatrix} 7 & 8 \\ 9 & 10 \\ 11 & 12 \end{bmatrix}$ **(A)** $\begin{bmatrix} 58 & 64 \\ 139 & 154 \end{bmatrix}$

(B) $\begin{bmatrix} 58 & 64 \\ 139 & 154 \end{bmatrix}$ **(C)** $\begin{bmatrix} 58 & 64 \\ 139 & 154 \end{bmatrix}$

(D) $\begin{bmatrix} 58 & 64 \\ 139 & 154 \end{bmatrix}$

Solution:

(A) $\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix} \begin{bmatrix} 7 & 8 \\ 9 & 10 \\ 11 & 12 \end{bmatrix}$

- $\begin{bmatrix} 1 \times 7 + 2 \times 9 + 3 \times 11 & 1 \times 8 + 2 \times 10 + 3 \times 12 \\ 4 \times 7 + 5 \times 9 + 6 \times 11 & 4 \times 8 + 5 \times 10 + 6 \times 12 \end{bmatrix}$
- $\begin{bmatrix} 7 + 18 + 33 & 8 + 20 + 36 \\ 28 + 45 + 66 & 32 + 50 + 72 \end{bmatrix}$
- $\begin{bmatrix} 58 & 64 \\ 139 & 154 \end{bmatrix}$

(B) $\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix} \begin{bmatrix} 7 & 8 \\ 9 & 10 \\ 11 & 12 \end{bmatrix}$

- $\begin{bmatrix} 1 \times 7 + 2 \times 9 + 3 \times 11 & 1 \times 8 + 2 \times 10 + 3 \times 12 \\ 4 \times 7 + 5 \times 9 + 6 \times 11 & 4 \times 8 + 5 \times 10 + 6 \times 12 \end{bmatrix}$
- $\begin{bmatrix} 7 + 18 + 33 & 8 + 20 + 36 \\ 28 + 45 + 66 & 32 + 50 + 72 \end{bmatrix}$
- $\begin{bmatrix} 58 & 64 \\ 139 & 154 \end{bmatrix}$

(C) $\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix} \begin{bmatrix} 7 & 8 \\ 9 & 10 \\ 11 & 12 \end{bmatrix}$

- $\begin{bmatrix} 1 \times 7 + 2 \times 9 + 3 \times 11 & 1 \times 8 + 2 \times 10 + 3 \times 12 \\ 4 \times 7 + 5 \times 9 + 6 \times 11 & 4 \times 8 + 5 \times 10 + 6 \times 12 \end{bmatrix}$
- $\begin{bmatrix} 7 + 18 + 33 & 8 + 20 + 36 \\ 28 + 45 + 66 & 32 + 50 + 72 \end{bmatrix}$
- $\begin{bmatrix} 58 & 64 \\ 139 & 154 \end{bmatrix}$

(D) $\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix} \begin{bmatrix} 7 & 8 \\ 9 & 10 \\ 11 & 12 \end{bmatrix}$

- $\begin{bmatrix} 1 \times 7 + 2 \times 9 + 3 \times 11 & 1 \times 8 + 2 \times 10 + 3 \times 12 \\ 4 \times 7 + 5 \times 9 + 6 \times 11 & 4 \times 8 + 5 \times 10 + 6 \times 12 \end{bmatrix}$
- $\begin{bmatrix} 7 + 18 + 33 & 8 + 20 + 36 \\ 28 + 45 + 66 & 32 + 50 + 72 \end{bmatrix}$
- $\begin{bmatrix} 58 & 64 \\ 139 & 154 \end{bmatrix}$

(8) $\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix} \begin{bmatrix} 7 & 8 \\ 9 & 10 \\ 11 & 12 \end{bmatrix}$ **(A)** $\begin{bmatrix} 58 & 64 \\ 139 & 154 \end{bmatrix}$

(B) $\begin{bmatrix} 58 & 64 \\ 139 & 154 \end{bmatrix}$ **(C)** $\begin{bmatrix} 58 & 64 \\ 139 & 154 \end{bmatrix}$

(D) $\begin{bmatrix} 58 & 64 \\ 139 & 154 \end{bmatrix}$

Solution:

(A) $\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix} \begin{bmatrix} 7 & 8 \\ 9 & 10 \\ 11 & 12 \end{bmatrix}$

- $\begin{bmatrix} 1 \times 7 + 2 \times 9 + 3 \times 11 & 1 \times 8 + 2 \times 10 + 3 \times 12 \\ 4 \times 7 + 5 \times 9 + 6 \times 11 & 4 \times 8 + 5 \times 10 + 6 \times 12 \end{bmatrix}$
- $\begin{bmatrix} 7 + 18 + 33 & 8 + 20 + 36 \\ 28 + 45 + 66 & 32 + 50 + 72 \end{bmatrix}$
- $\begin{bmatrix} 58 & 64 \\ 139 & 154 \end{bmatrix}$

(B) $\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix} \begin{bmatrix} 7 & 8 \\ 9 & 10 \\ 11 & 12 \end{bmatrix}$

- $\begin{bmatrix} 1 \times 7 + 2 \times 9 + 3 \times 11 & 1 \times 8 + 2 \times 10 + 3 \times 12 \\ 4 \times 7 + 5 \times 9 + 6 \times 11 & 4 \times 8 + 5 \times 10 + 6 \times 12 \end{bmatrix}$
- $\begin{bmatrix} 7 + 18 + 33 & 8 + 20 + 36 \\ 28 + 45 + 66 & 32 + 50 + 72 \end{bmatrix}$
- $\begin{bmatrix} 58 & 64 \\ 139 & 154 \end{bmatrix}$

(C) $\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix} \begin{bmatrix} 7 & 8 \\ 9 & 10 \\ 11 & 12 \end{bmatrix}$

- $\begin{bmatrix} 1 \times 7 + 2 \times 9 + 3 \times 11 & 1 \times 8 + 2 \times 10 + 3 \times 12 \\ 4 \times 7 + 5 \times 9 + 6 \times 11 & 4 \times 8 + 5 \times 10 + 6 \times 12 \end{bmatrix}$
- $\begin{bmatrix} 7 + 18 + 33 & 8 + 20 + 36 \\ 28 + 45 + 66 & 32 + 50 + 72 \end{bmatrix}$
- $\begin{bmatrix} 58 & 64 \\ 139 & 154 \end{bmatrix}$

(D) $\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix} \begin{bmatrix} 7 & 8 \\ 9 & 10 \\ 11 & 12 \end{bmatrix}$

- $\begin{bmatrix} 1 \times 7 + 2 \times 9 + 3 \times 11 & 1 \times 8 + 2 \times 10 + 3 \times 12 \\ 4 \times 7 + 5 \times 9 + 6 \times 11 & 4 \times 8 + 5 \times 10 + 6 \times 12 \end{bmatrix}$
- $\begin{bmatrix} 7 + 18 + 33 & 8 + 20 + 36 \\ 28 + 45 + 66 & 32 + 50 + 72 \end{bmatrix}$
- $\begin{bmatrix} 58 & 64 \\ 139 & 154 \end{bmatrix}$

(9) $\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix} \begin{bmatrix} 7 & 8 \\ 9 & 10 \\ 11 & 12 \end{bmatrix}$ **(A)** $\begin{bmatrix} 58 & 64 \\ 139 & 154 \end{bmatrix}$

(B) $\begin{bmatrix} 58 & 64 \\ 139 & 154 \end{bmatrix}$ **(C)** $\begin{bmatrix} 58 & 64 \\ 139 & 154 \end{bmatrix}$

(D) $\begin{bmatrix} 58 & 64 \\ 139 & 154 \end{bmatrix}$

Solution:

(A) $\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix} \begin{bmatrix} 7 & 8 \\ 9 & 10 \\ 11 & 12 \end{bmatrix}$

- $\begin{bmatrix} 1 \times 7 + 2 \times 9 + 3 \times 11 & 1 \times 8 + 2 \times 10 + 3 \times 12 \\ 4 \times 7 + 5 \times 9 + 6 \times 11 & 4 \times 8 + 5 \times 10 + 6 \times 12 \end{bmatrix}$
- $\begin{bmatrix} 7 + 18 + 33 & 8 + 20 + 36 \\ 28 + 45 + 66 & 32 + 50 + 72 \end{bmatrix}$
- $\begin{bmatrix} 58 & 64 \\ 139 & 154 \end{bmatrix}$

(B) $\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix} \begin{bmatrix} 7 & 8 \\ 9 & 10 \\ 11 & 12 \end{bmatrix}$

- $\begin{bmatrix} 1 \times 7 + 2 \times 9 + 3 \times 11 & 1 \times 8 + 2 \times 10 + 3 \times 12 \\ 4 \times 7 + 5 \times 9 + 6 \times 11 & 4 \times 8 + 5 \times 10 + 6 \times 12 \end{bmatrix}$
- $\begin{bmatrix} 7 + 18 + 33 & 8 + 20 + 36 \\ 28 + 45 + 66 & 32 + 50 + 72 \end{bmatrix}$
- $\begin{bmatrix} 58 & 64 \\ 139 & 154 \end{bmatrix}$

(C) $\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix} \begin{bmatrix} 7 & 8 \\ 9 & 10 \\ 11 & 12 \end{bmatrix}$

- $\begin{bmatrix} 1 \times 7 + 2 \times 9 + 3 \times 11 & 1 \times 8 + 2 \times 10 + 3 \times 12 \\ 4 \times 7 + 5 \times 9 + 6 \times 11 & 4 \times 8 + 5 \times 10 + 6 \times 12 \end{bmatrix}$
- $\begin{bmatrix} 7 + 18 + 33 & 8 + 20 + 36 \\ 28 + 45 + 66 & 32 + 50 + 72 \end{bmatrix}$
- $\begin{bmatrix} 58 & 64 \\ 139 & 154 \end{bmatrix}$

(D) $\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix} \begin{bmatrix} 7 & 8 \\ 9 & 10 \\ 11 & 12 \end{bmatrix}$

- $\begin{bmatrix} 1 \times 7 + 2 \times 9 + 3 \times 11 & 1 \times 8 + 2 \times 10 + 3 \times 12 \\ 4 \times 7 + 5 \times 9 + 6 \times 11 & 4 \times 8 + 5 \times 10 + 6 \times 12 \end{bmatrix}$
- $\begin{bmatrix} 7 + 18 + 33 & 8 + 20 + 36 \\ 28 + 45 + 66 & 32 + 50 + 72 \end{bmatrix}$
- $\begin{bmatrix} 58 & 64 \\ 139 & 154 \end{bmatrix}$

(10) $\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix} \begin{bmatrix} 7 & 8 \\ 9 & 10 \\ 11 & 12 \end{bmatrix}$ **(A)** $\begin{bmatrix} 58 & 64 \\ 139 & 154 \end{bmatrix}$

(B) $\begin{bmatrix} 58 & 64 \\ 139 & 154 \end{bmatrix}$ **(C)** $\begin{bmatrix} 58 & 64 \\ 139 & 154 \end{bmatrix}$

(D) $\begin{bmatrix} 58 & 64 \\ 139 & 154 \end{bmatrix}$

Solution:

(A) $\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix} \begin{bmatrix} 7 & 8 \\ 9 & 10 \\ 11 & 12 \end{bmatrix}$

- $\begin{bmatrix} 1 \times 7 + 2 \times 9 + 3 \times 11 & 1 \times 8 + 2 \times 10 + 3 \times 12 \\ 4 \times 7 + 5 \times 9 + 6 \times 11 & 4 \times 8 + 5 \times 10 + 6 \times 12 \end{bmatrix}$
- $\begin{bmatrix} 7 + 18 + 33 & 8 + 20 + 36 \\ 28 + 45 + 66 & 32 + 50 + 72 \end{bmatrix}$
- $\begin{bmatrix} 58 & 64 \\ 139 & 154 \end{bmatrix}$

(B) $\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix} \begin{bmatrix} 7 & 8 \\ 9 & 10 \\ 11 & 12 \end{bmatrix}$

- $\begin{bmatrix} 1 \times 7 + 2 \times 9 + 3 \times 11 & 1 \times 8 + 2 \times 10 + 3 \times 12 \\ 4 \times 7 + 5 \times 9 + 6 \times 11 & 4 \times 8 + 5 \times 10 + 6 \times 12 \end{bmatrix}$
- $\begin{bmatrix} 7 + 18 + 33 & 8 + 20 + 36 \\ 28 + 45 + 66 & 32 + 50 + 72 \end{bmatrix}$
- $\begin{bmatrix} 58 & 64 \\ 139 & 154 \end{bmatrix}$

(C) $\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix} \begin{bmatrix} 7 & 8 \\ 9 & 10 \\ 11 & 12 \end{bmatrix}$

- $\begin{bmatrix} 1 \times 7 + 2 \times 9 + 3 \times 11 & 1 \times 8 + 2 \times 10 + 3 \times 12 \\ 4 \times 7 + 5 \times 9 + 6 \times 11 & 4 \times 8 + 5 \times 10 + 6 \times 12 \end{bmatrix}$
- $\begin{bmatrix} 7 + 18 + 33 & 8 + 20 + 36 \\ 28 + 45 + 66 & 32 + 50 + 72 \end{bmatrix}$
- $\begin{bmatrix} 58 & 64 \\ 139 & 154 \end{bmatrix}$

(D) $\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix} \begin{bmatrix} 7 & 8 \\ 9 & 10 \\ 11 & 12 \end{bmatrix}$

- $\begin{bmatrix} 1 \times 7 + 2 \times 9 + 3 \times 11 & 1 \times 8 + 2 \times 10 + 3 \times 12 \\ 4 \times 7 + 5 \times 9 + 6 \times 11 & 4 \times 8 + 5 \times 10 + 6 \times 12 \end{bmatrix}$
- $\begin{bmatrix} 7 + 18 + 33 & 8 + 20 + 36 \\ 28 + 45 + 66 & 32 + 50 + 72 \end{bmatrix}$
- $\begin{bmatrix} 58 & 64 \\ 139 & 154 \end{bmatrix}$

(11) $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} \begin{bmatrix} 5 & 6 \\ 7 & 8 \end{bmatrix}$ **(A)** $\begin{bmatrix} 19 & 22 \\ 43 & 50 \end{bmatrix}$

(B) $\begin{bmatrix} 19 & 22 \\ 43 & 50 \end{bmatrix}$ **(C)** $\begin{bmatrix} 19 & 22 \\ 43 & 50 \end{bmatrix}$

(D) $\begin{bmatrix} 19 & 22 \\ 43 & 50 \end{bmatrix}$

Solution:

(A) $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} \begin{bmatrix} 5 & 6 \\ 7 & 8 \end{bmatrix}$

- $\begin{bmatrix} 1 \times 5 + 2 \times 7 & 1 \times 6 + 2 \times 8 \\ 3 \times 5 + 4 \times 7 & 3 \times 6 + 4 \times 8 \end{bmatrix}$
- $\begin{bmatrix} 5 + 14 & 6 + 16 \\ 15 + 28 & 18 + 32 \end{bmatrix}$
- $\begin{bmatrix} 19 & 22 \\ 43 & 50 \end{bmatrix}$

(B) $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} \begin{bmatrix} 5 & 6 \\ 7 & 8 \end{bmatrix}$

- $\begin{bmatrix} 1 \times 5 + 2 \times 7 & 1 \times 6 + 2 \times 8 \\ 3 \times 5 + 4 \times 7 & 3 \times 6 + 4 \times 8 \end{bmatrix}$
- $\begin{bmatrix} 5 + 14 & 6 + 16 \\ 15 + 28 & 18 + 32 \end{bmatrix}$
- $\begin{bmatrix} 19 & 22 \\ 43 & 50 \end{bmatrix}$

(C) $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} \begin{bmatrix} 5 & 6 \\ 7 & 8 \end{bmatrix}$

- $\begin{bmatrix} 1 \times 5 + 2 \times 7 & 1 \times 6 + 2 \times 8 \\ 3 \times 5 + 4 \times 7 & 3 \times 6 + 4 \times 8 \end{bmatrix}$
- $\begin{bmatrix} 5 + 14 & 6 + 16 \\ 15 + 28 & 18 + 32 \end{bmatrix}$
- $\begin{bmatrix} 19 & 22 \\ 43 & 50 \end{bmatrix}$

(D) $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} \begin{bmatrix} 5 & 6 \\ 7 & 8 \end{bmatrix}$

- $\begin{bmatrix} 1 \times 5 + 2 \times 7 & 1 \times 6 + 2 \times 8 \\ 3 \times 5 + 4 \times 7 & 3 \times 6 + 4 \times 8 \end{bmatrix}$
- $\begin{bmatrix} 5 + 14 & 6 + 16 \\ 15 + 28 & 18 + 32 \end{bmatrix}$
- $\begin{bmatrix} 19 & 22 \\ 43 & 50 \end{bmatrix}$

(12) $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} \begin{bmatrix} 5 & 6 \\ 7 & 8 \end{bmatrix}$ **(A)** $\begin{bmatrix} 19 & 22 \\ 43 & 50 \end{bmatrix}$

(B) $\begin{bmatrix} 19 & 22 \\ 43 & 50 \end{bmatrix}$ **(C)** $\begin{bmatrix} 19 & 22 \\ 43 & 50 \end{bmatrix}$

(D) $\begin{bmatrix} 19 & 22 \\ 43 & 50 \end{bmatrix}$

Solution:

(A) $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} \begin{bmatrix} 5 & 6 \\ 7 &

Exercise 1.5

Q1. Find the additive inverse of the following matrices

(i) $\begin{bmatrix} 2 & -3 \\ 5 & 7 \end{bmatrix}$ (ii) $\begin{bmatrix} -1 & 5 \\ 6 & 7 \end{bmatrix}$

(iii) $\begin{bmatrix} 2 & 3 \\ -4 & 5 \end{bmatrix}$ (iv) $\begin{bmatrix} 1 & -2 \\ -3 & 4 \end{bmatrix}$

Solution

(i) $\begin{bmatrix} 2 & -3 \\ 5 & 7 \end{bmatrix}$

Additive inverse of the matrix is calculated as

$-\begin{bmatrix} 2 & -3 \\ 5 & 7 \end{bmatrix} = \begin{bmatrix} -2 & 3 \\ -5 & -7 \end{bmatrix}$

$\therefore$ **ans** $\begin{bmatrix} -2 & 3 \\ -5 & -7 \end{bmatrix}$

(ii) $\begin{bmatrix} -1 & 5 \\ 6 & 7 \end{bmatrix}$

Additive inverse of the matrix is calculated as

$-\begin{bmatrix} -1 & 5 \\ 6 & 7 \end{bmatrix} = \begin{bmatrix} 1 & -5 \\ -6 & -7 \end{bmatrix}$

$\therefore$ **ans** $\begin{bmatrix} 1 & -5 \\ -6 & -7 \end{bmatrix}$

(iii) $\begin{bmatrix} 2 & 3 \\ -4 & 5 \end{bmatrix}$

Additive inverse of the matrix is calculated as

$-\begin{bmatrix} 2 & 3 \\ -4 & 5 \end{bmatrix} = \begin{bmatrix} -2 & -3 \\ 4 & -5 \end{bmatrix}$

$\therefore$ **ans** $\begin{bmatrix} -2 & -3 \\ 4 & -5 \end{bmatrix}$

(iv) $\begin{bmatrix} 1 & -2 \\ -3 & 4 \end{bmatrix}$

Additive inverse of the matrix is calculated as

$-\begin{bmatrix} 1 & -2 \\ -3 & 4 \end{bmatrix} = \begin{bmatrix} -1 & 2 \\ 3 & -4 \end{bmatrix}$

$\therefore$ **ans** $\begin{bmatrix} -1 & 2 \\ 3 & -4 \end{bmatrix}$

Q2. Find value of the following matrices are diagonal, symmetric or upper triangular

(i) $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ (ii) $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$

(iii) $\begin{bmatrix} 1 & 2 \\ 2 & 1 \end{bmatrix}$ (iv) $\begin{bmatrix} 1 & 2 \\ 0 & 1 \end{bmatrix}$

Solution

A matrix is said to be diagonal if its determinant is equal to zero, i.e., $|A| = 0$

(i) $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$

Determinant of matrix is calculated as

$\begin{vmatrix} 1 & 0 \\ 0 & 1 \end{vmatrix} = 1 - 0 = 1$

$\therefore$ Determinant of matrix is not equal to zero, A is not a diagonal matrix.

(ii) $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$

Determinant of matrix is calculated as

$\begin{vmatrix} 1 & 2 \\ 3 & 4 \end{vmatrix} = 4 - 6 = -2$

$\therefore$ Determinant of matrix is not equal to zero, A is not a diagonal matrix.

(iii) $\begin{bmatrix} 1 & 2 \\ 2 & 1 \end{bmatrix}$

Determinant of matrix is calculated as

$\begin{vmatrix} 1 & 2 \\ 2 & 1 \end{vmatrix} = 1 - 4 = -3$

$\therefore$ **A is not diagonal matrix**

Determinant of matrix is calculated as

$\begin{vmatrix} 1 & 2 \\ 0 & 1 \end{vmatrix} = 1 - 0 = 1$

$\therefore$ Determinant of matrix is not equal to zero, A is not a diagonal matrix.

(iv) $\begin{bmatrix} 1 & 2 \\ 0 & 1 \end{bmatrix}$

$\therefore$ Determinant of matrix is equal to zero, A is a diagonal matrix.

Q3. Find the multiplicative inverse of matrices of

(i) $\begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix}$ (ii) $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$

(iii) $\begin{bmatrix} 1 & 2 \\ 2 & 1 \end{bmatrix}$ (iv) $\begin{bmatrix} 1 & 2 \\ 0 & 1 \end{bmatrix}$

Solution

(i) $\begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix}$

Find the multiplicative inverse of matrix A is calculated as

$A^{-1} = \frac{1}{|A|} \begin{bmatrix} 5 & -3 \\ -4 & 2 \end{bmatrix}$

$\text{where } |A| = \begin{vmatrix} 2 & 3 \\ 4 & 5 \end{vmatrix}$

$= 10 - 12$

$= -2$

$\therefore$ $A^{-1} = \frac{1}{-2} \begin{bmatrix} 5 & -3 \\ -4 & 2 \end{bmatrix}$

$\therefore$ $A^{-1} = \begin{bmatrix} -\frac{5}{2} & \frac{3}{2} \\ 2 & -1 \end{bmatrix}$

Hence the multiplicative inverse of matrix A is calculated as

$A^{-1} = \begin{bmatrix} -\frac{5}{2} & \frac{3}{2} \\ 2 & -1 \end{bmatrix}$

(ii) $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$

Find the multiplicative inverse of matrix A is calculated as

$A^{-1} = \frac{1}{|A|} \begin{bmatrix} 4 & -2 \\ -3 & 1 \end{bmatrix}$

$\text{where } |A| = \begin{vmatrix} 1 & 2 \\ 3 & 4 \end{vmatrix}$

$= 4 - 6$

$= -2$

$\therefore$ $A^{-1} = \frac{1}{-2} \begin{bmatrix} 4 & -2 \\ -3 & 1 \end{bmatrix}$

$\therefore$ $A^{-1} = \begin{bmatrix} -2 & 1 \\ \frac{3}{2} & -\frac{1}{2} \end{bmatrix}$

Hence the multiplicative inverse of matrix A is calculated as

$A^{-1} = \begin{bmatrix} -2 & 1 \\ \frac{3}{2} & -\frac{1}{2} \end{bmatrix}$

(iii) $\begin{bmatrix} 1 & 2 \\ 2 & 1 \end{bmatrix}$

Find the multiplicative inverse of matrix A is calculated as

$A^{-1} = \frac{1}{|A|} \begin{bmatrix} 1 & -2 \\ -2 & 1 \end{bmatrix}$

$\text{where } |A| = \begin{vmatrix} 1 & 2 \\ 2 & 1 \end{vmatrix}$

$= 1 - 4$

$= -3$

$\therefore$ $A^{-1} = \frac{1}{-3} \begin{bmatrix} 1 & -2 \\ -2 & 1 \end{bmatrix}$

$\therefore$ $A^{-1} = \begin{bmatrix} -\frac{1}{3} & \frac{2}{3} \\ \frac{2}{3} & -\frac{1}{3} \end{bmatrix}$

Hence the multiplicative inverse of matrix A is calculated as

$A^{-1} = \begin{bmatrix} -\frac{1}{3} & \frac{2}{3} \\ \frac{2}{3} & -\frac{1}{3} \end{bmatrix}$

(iv) $\begin{bmatrix} 1 & 2 \\ 0 & 1 \end{bmatrix}$

Find the multiplicative inverse of matrix A is calculated as

$A^{-1} = \frac{1}{|A|} \begin{bmatrix} 1 & -2 \\ 0 & 1 \end{bmatrix}$

$\text{where } |A| = \begin{vmatrix} 1 & 2 \\ 0 & 1 \end{vmatrix}$

$= 1 - 0$

$= 1$

$\therefore$ $A^{-1} = \frac{1}{1} \begin{bmatrix} 1 & -2 \\ 0 & 1 \end{bmatrix}$

$\therefore$ $A^{-1} = \begin{bmatrix} 1 & -2 \\ 0 & 1 \end{bmatrix}$

Hence the multiplicative inverse of matrix A is calculated as

$A^{-1} = \begin{bmatrix} 1 & -2 \\ 0 & 1 \end{bmatrix}$

Q4. $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$

$B = \begin{bmatrix} -1 & 5 \\ 6 & 7 \end{bmatrix}$

$C = \begin{bmatrix} 2 & 3 \\ -4 & 5 \end{bmatrix}$

$D = \begin{bmatrix} 1 & -2 \\ -3 & 4 \end{bmatrix}$

Find $A + B$, $B + C$ and $A + D$

Solution

$A + B = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} + \begin{bmatrix} -1 & 5 \\ 6 & 7 \end{bmatrix}$

$\text{where } A + B = \begin{bmatrix} 1 + (-1) & 2 + 5 \\ 3 + 6 & 4 + 7 \end{bmatrix}$

$\therefore$ **ans** $\begin{bmatrix} 0 & 7 \\ 9 & 11 \end{bmatrix}$

$B + C = \begin{bmatrix} -1 & 5 \\ 6 & 7 \end{bmatrix} + \begin{bmatrix} 2 & 3 \\ -4 & 5 \end{bmatrix}$

$\text{where } B + C = \begin{bmatrix} -1 + 2 & 5 + 3 \\ 6 + (-4) & 7 + 5 \end{bmatrix}$

$\therefore$ **ans** $\begin{bmatrix} 1 & 8 \\ 2 & 12 \end{bmatrix}$

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

$\text{where } A + D = \begin{bmatrix} 1 + 1 & 2 + (-2) \\ 3 + (-3) & 4 + 4 \end{bmatrix}$

$\therefore$ **ans** $\begin{bmatrix} 2 & 0 \\ 0 & 8 \end{bmatrix}$

Q5. $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$

$B = \begin{bmatrix} -1 & 5 \\ 6 & 7 \end{bmatrix}$

$C = \begin{bmatrix} 2 & 3 \\ -4 & 5 \end{bmatrix}$

$D = \begin{bmatrix} 1 & -2 \\ -3 & 4 \end{bmatrix}$

Find $A - B$, $B - C$ and $A - D$

Solution

$A - B = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} - \begin{bmatrix} -1 & 5 \\ 6 & 7 \end{bmatrix}$

$\text{where } A - B = \begin{bmatrix} 1 - (-1) & 2 - 5 \\ 3 - 6 & 4 - 7 \end{bmatrix}$

$\therefore$ **ans** $\begin{bmatrix} 2 & -3 \\ -3 & -3 \end{bmatrix}$

$B - C = \begin{bmatrix} -1 & 5 \\ 6 & 7 \end{bmatrix} - \begin{bmatrix} 2 & 3 \\ -4 & 5 \end{bmatrix}$

$\text{where } B - C = \begin{bmatrix} -1 - 2 & 5 - 3 \\ 6 - (-4) & 7 - 5 \end{bmatrix}$

$\therefore$ **ans** $\begin{bmatrix} -3 & 2 \\ 10 & 2 \end{bmatrix}$

$A - D = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} - \begin{bmatrix} 1 & -2 \\ -3 & 4 \end{bmatrix}$

$\text{where } A - D = \begin{bmatrix} 1 - 1 & 2 - (-2) \\ 3 - (-3) & 4 - 4 \end{bmatrix}$

$\therefore$ **ans** $\begin{bmatrix} 0 & 4 \\ 6 & 0 \end{bmatrix}$

Q6. $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$

$B = \begin{bmatrix} -1 & 5 \\ 6 & 7 \end{bmatrix}$

$C = \begin{bmatrix} 2 & 3 \\ -4 & 5 \end{bmatrix}$

$D = \begin{bmatrix} 1 & -2 \\ -3 & 4 \end{bmatrix}$

Find $3A$, $-B$

$3A = 3 \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$

$\text{where } 3A = \begin{bmatrix} 3 \times 1 & 3 \times 2 \\ 3 \times 3 & 3 \times 4 \end{bmatrix}$

$\therefore$ **ans** $\begin{bmatrix} 3 & 6 \\ 9 & 12 \end{bmatrix}$

$-B = -\begin{bmatrix} -1 & 5 \\ 6 & 7 \end{bmatrix}$

$\text{where } -B = \begin{bmatrix} -(-1) & -5 \\ -6 & -7 \end{bmatrix}$

$\therefore$ **ans** $\begin{bmatrix} 1 & -5 \\ -6 & -7 \end{bmatrix}$

Find $3A - 2C$

$3A = 3 \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$

$\text{where } 3A = \begin{bmatrix} 3 \times 1 & 3 \times 2 \\ 3 \times 3 & 3 \times 4 \end{bmatrix}$

$\therefore$ **ans** $\begin{bmatrix} 3 & 6 \\ 9 & 12 \end{bmatrix}$

$-2C = -2 \begin{bmatrix} 2 & 3 \\ -4 & 5 \end{bmatrix}$

$\text{where } -2C = \begin{bmatrix} -2 \times 2 & -2 \times 3 \\ -2 \times -4 & -2 \times 5 \end{bmatrix}$

$\therefore$ **ans** $\begin{bmatrix} -4 & -6 \\ 8 & -10 \end{bmatrix}$

Find $4A$, $-3B$, $2C$

$4A = 4 \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$

$\text{where } 4A = \begin{bmatrix} 4 \times 1 & 4 \times 2 \\ 4 \times 3 & 4 \times 4 \end{bmatrix}$

$\therefore$ **ans** $\begin{bmatrix} 4 & 8 \\ 12 & 16 \end{bmatrix}$

$-3B = -3 \begin{bmatrix} -1 & 5 \\ 6 & 7 \end{bmatrix}$

$\text{where } -3B = \begin{bmatrix} -3 \times -1 & -3 \times 5 \\ -3 \times 6 & -3 \times 7 \end{bmatrix}$

$\therefore$ **ans** $\begin{bmatrix} 3 & -15 \\ -18 & -21 \end{bmatrix}$

$2C = 2 \begin{bmatrix} 2 & 3 \\ -4 & 5 \end{bmatrix}$

$\text{where } 2C = \begin{bmatrix} 2 \times 2 & 2 \times 3 \\ 2 \times -4 & 2 \times 5 \end{bmatrix}$

$\therefore$ **ans** $\begin{bmatrix} 4 & 6 \\ -8 & 10 \end{bmatrix}$

Find $3A - 4B + 2C$

$3A = 3 \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$

$\text{where } 3A = \begin{bmatrix} 3 \times 1 & 3 \times 2 \\ 3 \times 3 & 3 \times 4 \end{bmatrix}$

$\therefore$ **ans** $\begin{bmatrix} 3 & 6 \\ 9 & 12 \end{bmatrix}$

$-4B = -4 \begin{bmatrix} -1 & 5 \\ 6 & 7 \end{bmatrix}$

$\text{where } -4B = \begin{bmatrix} -4 \times -1 & -4 \times 5 \\ -4 \times 6 & -4 \times 7 \end{bmatrix}$

$\therefore$ **ans** $\begin{bmatrix} 4 & -20 \\ -24 & -28 \end{bmatrix}$

$2C = 2 \begin{bmatrix} 2 & 3 \\ -4 & 5 \end{bmatrix}$

$\text{where } 2C = \begin{bmatrix} 2 \times 2 & 2 \times 3 \\ 2 \times -4 & 2 \times 5 \end{bmatrix}$

$\therefore$ **ans** $\begin{bmatrix} 4 & 6 \\ -8 & 10 \end{bmatrix}$

Q7. Find matrix X and Y if

(i) $X + Y = \begin{bmatrix} 7 & 0 \\ 3 & 5 \end{bmatrix}$ and $X - Y = \begin{bmatrix} 3 & 0 \\ 1 & 1 \end{bmatrix}$

(ii) $2X + Y = \begin{bmatrix} 6 & 7 \\ 0 & 10 \end{bmatrix}$ and $X + Y = \begin{bmatrix} 2 & 3 \\ 1 & 4 \end{bmatrix}$

Solution

(i) $X + Y = \begin{bmatrix} 7 & 0 \\ 3 & 5 \end{bmatrix}$ and $X - Y = \begin{bmatrix} 3 & 0 \\ 1 & 1 \end{bmatrix}$

$\text{where } X + Y = \begin{bmatrix} 7 & 0 \\ 3 & 5 \end{bmatrix} \quad \text{and} \quad X - Y = \begin{bmatrix} 3 & 0 \\ 1 & 1 \end{bmatrix}$

$\text{where } X = \begin{bmatrix} 5 & 0 \\ 2 & 3 \end{bmatrix}$

$\therefore$ **ans** $\begin{bmatrix} 5 & 0 \\ 2 & 3 \end{bmatrix}$

$\text{where } Y = \begin{bmatrix} 2 & 0 \\ 1 & 2 \end{bmatrix}$

$\therefore$ **ans** $\begin{bmatrix} 2 & 0 \\ 1 & 2 \end{bmatrix}$

(ii) $2X + Y = \begin{bmatrix} 6 & 7 \\ 0 & 10 \end{bmatrix}$ and $X + Y = \begin{bmatrix} 2 & 3 \\ 1 & 4 \end{bmatrix}$

$\text{where } 2X + Y = \begin{bmatrix} 6 & 7 \\ 0 & 10 \end{bmatrix} \quad \text{and} \quad X + Y = \begin{bmatrix} 2 & 3 \\ 1 & 4 \end{bmatrix}$

$\text{where } X = \begin{bmatrix} 4 & 4 \\ 0 & 6 \end{bmatrix}$

$\therefore$ **ans** $\begin{bmatrix} 4 & 4 \\ 0 & 6 \end{bmatrix}$

$\text{where } Y = \begin{bmatrix} -2 & -1 \\ 1 & -2 \end{bmatrix}$

$\therefore$ **ans** $\begin{bmatrix} -2 & -1 \\ 1 & -2 \end{bmatrix}$

Q8. Find X if, $Y = \begin{bmatrix} 2 & 5 \\ 1 & 3 \end{bmatrix}$ and $2X + Y = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$

Solution

$\text{where } 2X + Y = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} \quad \text{and} \quad Y = \begin{bmatrix} 2 & 5 \\ 1 & 3 \end{bmatrix}$

$\text{where } 2X = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} - \begin{bmatrix} 2 & 5 \\ 1 & 3 \end{bmatrix}$

$\text{where } 2X = \begin{bmatrix} 1 - 2 & 0 - 5 \\ 0 - 1 & 1 - 3 \end{bmatrix}$

$\therefore$ **ans** $\begin{bmatrix} -1 & -5 \\ -1 & -2 \end{bmatrix}$

$\text{where } X = \begin{bmatrix} -1 & -5 \\ -1 & -2 \end{bmatrix}$

$\therefore$ **ans** $\begin{bmatrix} -1 & -5 \\ -1 & -2 \end{bmatrix}$

Find $3A - 4B + 2C$

$3A = 3 \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$

$\text{where } 3A = \begin{bmatrix} 3 \times 1 & 3 \times 2 \\ 3 \times 3 & 3 \times 4 \end{bmatrix}$

$\therefore$ **ans** $\begin{bmatrix} 3 & 6 \\ 9 & 12 \end{bmatrix}$

$-4B = -4 \begin{bmatrix} -1 & 5 \\ 6 & 7 \end{bmatrix}$

$\text{where } -4B = \begin{bmatrix} -4 \times -1 & -4 \times 5 \\ -4 \times 6 & -4 \times 7 \end{bmatrix}$

$\therefore$ **ans** $\begin{bmatrix} 4 & -20 \\ -24 & -28 \end{bmatrix}$

$2C = 2 \begin{bmatrix} 2 & 3 \\ -4 & 5 \end{bmatrix}$

$\text{where } 2C = \begin{bmatrix} 2 \times 2 & 2 \times 3 \\ 2 \times -4 & 2 \times 5 \end{bmatrix}$

$\therefore$ **ans** $\begin{bmatrix} 4 & 6 \\ -8 & 10 \end{bmatrix}$

Find $4A - 3B + 2C$

$4A = 4 \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$

$\text{where } 4A = \begin{bmatrix} 4 \times 1 & 4 \times 2 \\ 4 \times 3 & 4 \times 4 \end{bmatrix}$

$\therefore$ **ans** $\begin{bmatrix} 4 & 8 \\ 12 & 16 \end{bmatrix}$

$-3B = -3 \begin{bmatrix} -1 & 5 \\ 6 & 7 \end{bmatrix}$

$\text{where } -3B = \begin{bmatrix} -3 \times -1 & -3 \times 5 \\ -3 \times 6 & -3 \times 7 \end{bmatrix}$

$\therefore$ **ans** $\begin{bmatrix} 3 & -15 \\ -18 & -21 \end{bmatrix}$

$2C = 2 \begin{bmatrix} 2 & 3 \\ -4 & 5 \end{bmatrix}$

$\text{where } 2C = \begin{bmatrix} 2 \times 2 & 2 \times 3 \\ 2 \times -4 & 2 \times 5 \end{bmatrix}$

$\therefore$ **ans** $\begin{bmatrix} 4 & 6 \\ -8 & 10 \end{bmatrix}$

Find $3A - 2B + 4C$

$3A = 3 \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$

$\text{where } 3A = \begin{bmatrix} 3 \times 1 & 3 \times 2 \\ 3 \times 3 & 3 \times 4 \end{bmatrix}$

$\therefore$ **ans** $\begin{bmatrix} 3 & 6 \\ 9 & 12 \end{bmatrix}$

$-2B = -2 \begin{bmatrix} -1 & 5 \\ 6 & 7 \end{bmatrix}$

$\text{where } -2B = \begin{bmatrix} -2 \times -1 & -2 \times 5 \\ -2 \times 6 & -2 \times 7 \end{bmatrix}$

$\therefore$ **ans** $\begin{bmatrix} 2 & -10 \\ -12 & -14 \end{bmatrix}$

$4C = 4 \begin{bmatrix} 2 & 3 \\ -4 & 5 \end{bmatrix}$

$\text{where } 4C = \begin{bmatrix} 4 \times 2 & 4 \times 3 \\ 4 \times -4 & 4 \times 5 \end{bmatrix}$

$\therefore$ **ans** $\begin{bmatrix} 8 & 12 \\ -16 & 20 \end{bmatrix}$

Find $3A - 4B + 2C$

$3A = 3 \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$

$\text{where } 3A = \begin{bmatrix} 3 \times 1 & 3 \times 2 \\ 3 \times 3 & 3 \times 4 \end{bmatrix}$

$\therefore$ **ans** $\begin{bmatrix} 3 & 6 \\ 9 & 12 \end{bmatrix}$

$-4B = -4 \begin{bmatrix} -1 & 5 \\ 6 & 7 \end{bmatrix}$

$\text{where } -4B = \begin{bmatrix} -4 \times -1 & -4 \times 5 \\ -4 \times 6 & -4 \times 7 \end{bmatrix}$

$\therefore$ **ans** $\begin{bmatrix} 4 & -20 \\ -24 & -28 \end{bmatrix}$

$2C = 2 \begin{bmatrix} 2 & 3 \\ -4 & 5 \end{bmatrix}$

$\text{where } 2C = \begin{bmatrix} 2 \times 2 & 2 \times 3 \\ 2 \times -4 & 2 \times 5 \end{bmatrix}$

$\therefore$ **ans** $\begin{bmatrix} 4 & 6 \\ -8 & 10 \end{bmatrix}$

Find $3A - 4B + 2C$

$3A = 3 \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$

$\text{where } 3A = \begin{bmatrix} 3 \times 1 & 3 \times 2 \\ 3 \times 3 & 3 \times 4 \end{bmatrix}$

$\therefore$ **ans** $\begin{bmatrix} 3 & 6 \\ 9 & 12 \end{bmatrix}$

$-4B = -4 \begin{bmatrix} -1 & 5 \\ 6 & 7 \end{bmatrix}$

$\text{where } -4B = \begin{bmatrix} -4 \times -1 & -4 \times 5 \\ -4 \times 6 & -4 \times 7 \end{bmatrix}$

$\therefore$ **ans** $\begin{bmatrix} 4 & -20 \\ -24 & -28 \end{bmatrix}$

$2C = 2 \begin{bmatrix} 2 & 3 \\ -4 & 5 \end{bmatrix}$

$\text{where } 2C = \begin{bmatrix} 2 \times 2 & 2 \times 3 \\ 2 \times -4 & 2 \times 5 \end{bmatrix}$

$\therefore$ **ans** $\begin{bmatrix} 4 & 6 \\ -8 & 10 \end{bmatrix}$

Find $3A - 4B + 2C$

$3A = 3 \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$

$\text{where } 3A = \begin{bmatrix} 3 \times 1 & 3 \times 2 \\ 3 \times 3 & 3 \times 4 \end{bmatrix}$

$\therefore$ **ans** $\begin{bmatrix} 3 & 6 \\ 9 & 12 \end{bmatrix}$

$-4B = -4 \begin{bmatrix} -1 & 5 \\ 6 & 7 \end{bmatrix}$

$\text{where } -4B = \begin{bmatrix} -4 \times -1 & -4 \times 5 \\ -4 \times 6 & -4 \times 7 \end{bmatrix}$

$\therefore$ **ans** $\begin{bmatrix} 4 & -20 \\ -24 & -28 \end{bmatrix}$

$2C = 2 \begin{bmatrix} 2 & 3 \\ -4 & 5 \end{bmatrix}$

$\text{where } 2C = \begin{bmatrix} 2 \times 2 & 2 \times 3 \\ 2 \times -4 & 2 \times 5 \end{bmatrix}$

$\therefore$ **ans** $\begin{bmatrix} 4 & 6 \\ -8 & 10 \end{bmatrix}$

Find $3A - 4B + 2C$

$3A = 3 \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$

$\text{where } 3A = \begin{bmatrix} 3 \times 1 & 3 \times 2 \\ 3 \times 3 & 3 \times 4 \end{bmatrix}$

$\therefore$ **ans** $\begin{bmatrix} 3 & 6 \\ 9 & 12 \end{bmatrix}$

$-4B = -4 \begin{bmatrix} -1 & 5 \\ 6 & 7 \end{bmatrix}$

$\text{where } -4B = \begin{bmatrix} -4 \times -1 & -4 \times 5 \\ -4 \times 6 & -4 \times 7 \end{bmatrix}$

$\therefore$ **ans** $\begin{bmatrix} 4 & -20 \\ -24 & -28 \end{bmatrix}$

$2C = 2 \begin{bmatrix} 2 & 3 \\ -4 & 5 \end{bmatrix}$

$\text{where } 2C = \begin{bmatrix} 2 \times 2 & 2 \times 3 \\ 2 \times -4 & 2 \times 5 \end{bmatrix}$

$\therefore$ **ans** $\begin{bmatrix} 4 & 6 \\ -8 & 10 \end{bmatrix}$

Find $3A - 4B + 2C$

$3A = 3 \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$

$\text{where } 3A = \begin{bmatrix} 3 \times 1 & 3 \times 2 \\ 3 \times 3 & 3 \times 4 \end{bmatrix}$

$\therefore$ **ans** $\begin{bmatrix} 3 & 6 \\ 9 & 12 \end{bmatrix}$

$-4B = -4 \begin{bmatrix} -1 & 5 \\ 6 & 7 \end{bmatrix}$

$\text{where } -4B = \begin{bmatrix} -4 \times -1 & -4 \times 5 \\ -4 \times 6 & -4 \times 7 \end{bmatrix}$

$\therefore$ **ans** $\begin{bmatrix} 4 & -20 \\ -24 & -28 \end{bmatrix}$

$2C = 2 \begin{bmatrix} 2 & 3 \\ -4 & 5 \end{bmatrix}$

$\text{where } 2C = \begin{bmatrix} 2 \times 2 & 2 \times 3 \\ 2 \times -4 & 2 \times 5 \end{bmatrix}$

$\therefore$ **ans** $\begin{bmatrix} 4 & 6 \\ -8 & 10 \end{bmatrix}$

Find $3A - 4B + 2C$

$3A = 3 \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$

$\text{where } 3A = \begin{bmatrix} 3 \times 1 & 3 \times 2 \\ 3 \times 3 & 3 \times 4 \end{bmatrix}$

$\therefore$ **ans** $\begin{bmatrix} 3 & 6 \\ 9 & 12 \end{bmatrix}$

$-4B = -4 \begin{bmatrix} -1 & 5 \\ 6 & 7 \end{bmatrix}$

$\text{where } -4B = \begin{bmatrix} -4 \times -1 & -4 \times 5 \\ -4 \times 6 & -4 \times 7 \end{bmatrix}$

$\therefore$ **ans** $\begin{bmatrix} 4 & -20 \\ -24 & -28 \end{bmatrix}$

$2C = 2 \begin{bmatrix} 2 & 3 \\ -4 & 5 \end{bmatrix}$

$\text{where } 2C = \begin{bmatrix} 2 \times 2 & 2 \times 3 \\ 2 \times -4 & 2 \times 5 \end{bmatrix}$

$\therefore$ **ans** $\begin{bmatrix} 4 & 6 \\ -8 & 10 \end{bmatrix}$

Find $3A - 4B + 2C$

$3A = 3 \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$

$\text{where } 3A = \begin{bmatrix} 3 \times 1 & 3 \times 2 \\ 3 \times 3 & 3 \times 4 \end{bmatrix}$

$\therefore$ **ans** $\begin{bmatrix} 3 & 6 \\ 9 & 12 \end{bmatrix}$

$-4B = -4 \begin{bmatrix} -1 & 5 \\ 6 & 7 \end{bmatrix}$

$\text{where } -4B = \begin{bmatrix} -4 \times -1 & -4 \times 5 \\ -4 \times 6 & -4 \times 7 \end{bmatrix}$

$\therefore$ **ans** $\begin{bmatrix} 4 & -20 \\ -24 & -28 \end{bmatrix}$

$2C = 2 \begin{bmatrix} 2 & 3 \\ -4 & 5 \end{bmatrix}$

$\text{where } 2C = \begin{bmatrix} 2 \times 2 & 2 \times 3 \\ 2 \times -4 & 2 \times 5 \end{bmatrix}$

$\therefore$ **ans** $\begin{bmatrix} 4 & 6 \\ -8 & 10 \end{bmatrix}$

Find $3A - 4B + 2C$

$3A = 3 \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$

$\text{where } 3A = \begin{bmatrix} 3 \times 1 & 3 \times 2 \\ 3 \times 3 & 3 \times 4 \end{bmatrix}$

$\therefore$ **ans** $\begin{bmatrix} 3 & 6 \\ 9 & 12 \end{bmatrix}$

$-4B = -4 \begin{bmatrix} -1 & 5 \\ 6 & 7 \end{bmatrix}$

$\text{where } -4B = \begin{bmatrix} -4 \times -1 & -4 \times 5 \\ -4 \times 6 & -4 \times 7 \end{bmatrix}$

$\therefore$ **ans** $\begin{bmatrix} 4 & -20 \\ -24 & -28 \end{bmatrix}$

$2C = 2 \begin{bmatrix} 2 & 3 \\ -4 & 5 \end{bmatrix}$

$\text{where } 2C = \begin{bmatrix} 2 \times 2 & 2 \times 3 \\ 2 \times -4 & 2 \times 5 \end{bmatrix}$

$\therefore$ **ans** $\begin{bmatrix} 4 & 6 \\ -8 & 10 \end{bmatrix}$

Find $3A - 4B + 2C$

$3A = 3 \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$

$\text{where } 3A = \begin{bmatrix} 3 \times 1 & 3 \times 2 \\ 3 \times 3 & 3 \times 4 \end{bmatrix}$

$\therefore$ **ans** $\begin{bmatrix} 3 & 6 \\ 9 & 12 \end{bmatrix}$

$-4B = -4 \begin{bmatrix} -1 & 5 \\ 6 & 7 \end{bmatrix}$

$\text{where } -4B = \begin{bmatrix} -4 \times -1 & -4 \times 5 \\ -4 \times 6 & -4 \times 7 \end{bmatrix}$

$\therefore$ **ans** $\begin{bmatrix} 4 & -20 \\ -24 & -28 \end{bmatrix}$

$2C = 2 \begin{bmatrix} 2 & 3 \\ -4 & 5 \end{bmatrix}$

$\text{where } 2C = \begin{bmatrix} 2 \times 2 & 2 \times 3 \\ 2 \times -4 & 2 \times 5 \end{bmatrix}$

$\therefore$ **ans** $\begin{bmatrix} 4 & 6 \\ -8 & 10 \end{bmatrix}$

Find $3A - 4B + 2C$

$3A = 3 \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$

$\text{where } 3A = \begin{bmatrix} 3 \times 1 & 3 \times 2 \\ 3 \times 3 & 3 \times 4 \end{bmatrix}$

$\therefore$ **ans** $\begin{bmatrix} 3 & 6 \\ 9 & 12 \end{bmatrix}$

$-4B = -4 \begin{bmatrix} -1 & 5 \\ 6 & 7 \end{bmatrix}$

$\text{where } -4B = \begin{bmatrix} -

Answer Key

Q1. Which of the following statements is false?

(A) Ionic compounds are hard and brittle.
(B) Ionic compounds have low melting and boiling points.
(C) Ionic compounds are soluble in water.
(D) Ionic compounds are good conductors of electricity in solid state.

Ans: (D) Ionic compounds are good conductors of electricity in solid state.

Q2. Which of the following is a pair of isotones?

(A) $^{14}_{6}C$ and $^{14}_{7}N$
(B) $^{40}_{18}Ar$ and $^{40}_{19}K$
(C) $^{35}_{17}Cl$ and $^{37}_{17}Cl$
(D) $^{1}_{1}H$ and $^{2}_{1}H$

Ans: (B) $^{40}_{18}Ar$ and $^{40}_{19}K$

Q3. Which of the following is a pair of isotones?

(A) $^{14}_{6}C$ and $^{14}_{7}N$
(B) $^{40}_{18}Ar$ and $^{40}_{19}K$
(C) $^{35}_{17}Cl$ and $^{37}_{17}Cl$
(D) $^{1}_{1}H$ and $^{2}_{1}H$

Ans: (B) $^{40}_{18}Ar$ and $^{40}_{19}K$

Q4. Which of the following is a pair of isotones?

(A) $^{14}_{6}C$ and $^{14}_{7}N$
(B) $^{40}_{18}Ar$ and $^{40}_{19}K$
(C) $^{35}_{17}Cl$ and $^{37}_{17}Cl$
(D) $^{1}_{1}H$ and $^{2}_{1}H$

Ans: (B) $^{40}_{18}Ar$ and $^{40}_{19}K$

Q5. Which of the following is a pair of isotones?

(A) $^{14}_{6}C$ and $^{14}_{7}N$
(B) $^{40}_{18}Ar$ and $^{40}_{19}K$
(C) $^{35}_{17}Cl$ and $^{37}_{17}Cl$
(D) $^{1}_{1}H$ and $^{2}_{1}H$

Ans: (B) $^{40}_{18}Ar$ and $^{40}_{19}K$

Q6. Which of the following is a pair of isotones?

(A) $^{14}_{6}C$ and $^{14}_{7}N$
(B) $^{40}_{18}Ar$ and $^{40}_{19}K$
(C) $^{35}_{17}Cl$ and $^{37}_{17}Cl$
(D) $^{1}_{1}H$ and $^{2}_{1}H$

Ans: (B) $^{40}_{18}Ar$ and $^{40}_{19}K$

Q7. Which of the following is a pair of isotones?

(A) $^{14}_{6}C$ and $^{14}_{7}N$
(B) $^{40}_{18}Ar$ and $^{40}_{19}K$
(C) $^{35}_{17}Cl$ and $^{37}_{17}Cl$
(D) $^{1}_{1}H$ and $^{2}_{1}H$

Ans: (B) $^{40}_{18}Ar$ and $^{40}_{19}K$

Q8. Which of the following is a pair of isotones?

(A) $^{14}_{6}C$ and $^{14}_{7}N$
(B) $^{40}_{18}Ar$ and $^{40}_{19}K$
(C) $^{35}_{17}Cl$ and $^{37}_{17}Cl$
(D) $^{1}_{1}H$ and $^{2}_{1}H$

Ans: (B) $^{40}_{18}Ar$ and $^{40}_{19}K$

Q9. Which of the following is a pair of isotones?

(A) $^{14}_{6}C$ and $^{14}_{7}N$
(B) $^{40}_{18}Ar$ and $^{40}_{19}K$
(C) $^{35}_{17}Cl$ and $^{37}_{17}Cl$
(D) $^{1}_{1}H$ and $^{2}_{1}H$

Ans: (B) $^{40}_{18}Ar$ and $^{40}_{19}K$

Q10. Which of the following is a pair of isotones?

(A) $^{14}_{6}C$ and $^{14}_{7}N$
(B) $^{40}_{18}Ar$ and $^{40}_{19}K$
(C) $^{35}_{17}Cl$ and $^{37}_{17}Cl$
(D) $^{1}_{1}H$ and $^{2}_{1}H$

Ans: (B) $^{40}_{18}Ar$ and $^{40}_{19}K$

Q11. Which of the following is a pair of isotones?

(A) $^{14}_{6}C$ and $^{14}_{7}N$
(B) $^{40}_{18}Ar$ and $^{40}_{19}K$
(C) $^{35}_{17}Cl$ and $^{37}_{17}Cl$
(D) $^{1}_{1}H$ and $^{2}_{1}H$

Ans: (B) $^{40}_{18}Ar$ and $^{40}_{19}K$

Q12. Which of the following is a pair of isotones?

(A) $^{14}_{6}C$ and $^{14}_{7}N$
(B) $^{40}_{18}Ar$ and $^{40}_{19}K$
(C) $^{35}_{17}Cl$ and $^{37}_{17}Cl$
(D) $^{1}_{1}H$ and $^{2}_{1}H$

Ans: (B) $^{40}_{18}Ar$ and $^{40}_{19}K$

Q13. Which of the following is a pair of isotones?

(A) $^{14}_{6}C$ and $^{14}_{7}N$
(B) $^{40}_{18}Ar$ and $^{40}_{19}K$
(C) $^{35}_{17}Cl$ and $^{37}_{17}Cl$
(D) $^{1}_{1}H$ and $^{2}_{1}H$

Ans: (B) $^{40}_{18}Ar$ and $^{40}_{19}K$

Q14. Which of the following is a pair of isotones?

(A) $^{14}_{6}C$ and $^{14}_{7}N$
(B) $^{40}_{18}Ar$ and $^{40}_{19}K$
(C) $^{35}_{17}Cl$ and $^{37}_{17}Cl$
(D) $^{1}_{1}H$ and $^{2}_{1}H$

Ans: (B) $^{40}_{18}Ar$ and $^{40}_{19}K$

Q15. Which of the following is a pair of isotones?

(A) $^{14}_{6}C$ and $^{14}_{7}N$
(B) $^{40}_{18}Ar$ and $^{40}_{19}K$
(C) $^{35}_{17}Cl$ and $^{37}_{17}Cl$
(D) $^{1}_{1}H$ and $^{2}_{1}H$

Ans: (B) $^{40}_{18}Ar$ and $^{40}_{19}K$

Q16. Which of the following is a pair of isotones?

(A) $^{14}_{6}C$ and $^{14}_{7}N$
(B) $^{40}_{18}Ar$ and $^{40}_{19}K$
(C) $^{35}_{17}Cl$ and $^{37}_{17}Cl$
(D) $^{1}_{1}H$ and $^{2}_{1}H$

Ans: (B) $^{40}_{18}Ar$ and $^{40}_{19}K$

Q17. Which of the following is a pair of isotones?

(A) $^{14}_{6}C$ and $^{14}_{7}N$
(B) $^{40}_{18}Ar$ and $^{40}_{19}K$
(C) $^{35}_{17}Cl$ and $^{37}_{17}Cl$
(D) $^{1}_{1}H$ and $^{2}_{1}H$

Ans: (B) $^{40}_{18}Ar$ and $^{40}_{19}K$

Q18. Which of the following is a pair of isotones?

(A) $^{14}_{6}C$ and $^{14}_{7}N$
(B) $^{40}_{18}Ar$ and $^{40}_{19}K$
(C) $^{35}_{17}Cl$ and $^{37}_{17}Cl$
(D) $^{1}_{1}H$ and $^{2}_{1}H$

Ans: (B) $^{40}_{18}Ar$ and $^{40}_{19}K$

Q19. Which of the following is a pair of isotones?

(A) $^{14}_{6}C$ and $^{14}_{7}N$
(B) $^{40}_{18}Ar$ and $^{40}_{19}K$
(C) $^{35}_{17}Cl$ and $^{37}_{17}Cl$
(D) $^{1}_{1}H$ and $^{2}_{1}H$

Ans: (B) $^{40}_{18}Ar$ and $^{40}_{19}K$

Q20. Which of the following is a pair of isotones?

(A) $^{14}_{6}C$ and $^{14}_{7}N$
(B) $^{40}_{18}Ar$ and $^{40}_{19}K$
(C) $^{35}_{17}Cl$ and $^{37}_{17}Cl$
(D) $^{1}_{1}H$ and $^{2}_{1}H$

Ans: (B) $^{40}_{18}Ar$ and $^{40}_{19}K$

Q21. Which of the following is a pair of isotones?

(A) $^{14}_{6}C$ and $^{14}_{7}N$
(B) $^{40}_{18}Ar$ and $^{40}_{19}K$
(C) $^{35}_{17}Cl$ and $^{37}_{17}Cl$
(D) $^{1}_{1}H$ and $^{2}_{1}H$

Ans: (B) $^{40}_{18}Ar$ and $^{40}_{19}K$

Q22. Which of the following is a pair of isotones?

(A) $^{14}_{6}C$ and $^{14}_{7}N$
(B) $^{40}_{18}Ar$ and $^{40}_{19}K$
(C) $^{35}_{17}Cl$ and $^{37}_{17}Cl$
(D) $^{1}_{1}H$ and $^{2}_{1}H$

Ans: (B) $^{40}_{18}Ar$ and $^{40}_{19}K$

Q23. Which of the following is a pair of isotones?

(A) $^{14}_{6}C$ and $^{14}_{7}N$
(B) $^{40}_{18}Ar$ and $^{40}_{19}K$
(C) $^{35}_{17}Cl$ and $^{37}_{17}Cl$
(D) $^{1}_{1}H$ and $^{2}_{1}H$

Ans: (B) $^{40}_{18}Ar$ and $^{40}_{19}K$

Q24. Which of the following is a pair of isotones?

(A) $^{14}_{6}C$ and $^{14}_{7}N$
(B) $^{40}_{18}Ar$ and $^{40}_{19}K$
(C) $^{35}_{17}Cl$ and $^{37}_{17}Cl$
(D) $^{1}_{1}H$ and $^{2}_{1}H$

Ans: (B) $^{40}_{18}Ar$ and $^{40}_{19}K$

Q25. Which of the following is a pair of isotones?

(A) $^{14}_{6}C$ and $^{14}_{7}N$
(B) $^{40}_{18}Ar$ and $^{40}_{19}K$
(C) $^{35}_{17}Cl$ and $^{37}_{17}Cl$
(D) $^{1}_{1}H$ and $^{2}_{1}H$

Ans: (B) $^{40}_{18}Ar$ and $^{40}_{19}K$

Q26. Which of the following is a pair of isotones?

(A) $^{14}_{6}C$ and $^{14}_{7}N$
(B) $^{40}_{18}Ar$ and $^{40}_{19}K$
(C) $^{35}_{17}Cl$ and $^{37}_{17}Cl$
(D) $^{1}_{1}H$ and $^{2}_{1}H$

Ans: (B) $^{40}_{18}Ar$ and $^{40}_{19}K$

Q27. Which of the following is a pair of isotones?

(A) $^{14}_{6}C$ and $^{14}_{7}N$
(B) $^{40}_{18}Ar$ and $^{40}_{19}K$
(C) $^{35}_{17}Cl$ and $^{37}_{17}Cl$
(D) $^{1}_{1}H$ and $^{2}_{1}H$

Ans: (B) $^{40}_{18}Ar$ and $^{40}_{19}K$

Q28. Which of the following is a pair of isotones?

(A) $^{14}_{6}C$ and $^{14}_{7}N$
(B) $^{40}_{18}Ar$ and $^{40}_{19}K$
(C) $^{35}_{17}Cl$ and $^{37}_{17}Cl$
(D) $^{1}_{1}H$ and $^{2}_{1}H$

Ans: (B) $^{40}_{18}Ar$ and $^{40}_{19}K$

Q29. Which of the following is a pair of isotones?

(A) $^{14}_{6}C$ and $^{14}_{7}N$
(B) $^{40}_{18}Ar$ and $^{40}_{19}K$
(C) $^{35}_{17}Cl$ and $^{37}_{17}Cl$
(D) $^{1}_{1}H$ and $^{2}_{1}H$

Ans: (B) $^{40}_{18}Ar$ and $^{40}_{19}K$

Q30. Which of the following is a pair of isotones?

(A) $^{14}_{6}C$ and $^{14}_{7}N$
(B) $^{40}_{18}Ar$ and $^{40}_{19}K$
(C) $^{35}_{17}Cl$ and $^{37}_{17}Cl$
(D) $^{1}_{1}H$ and $^{2}_{1}H$

Ans: (B) $^{40}_{18}Ar$ and $^{40}_{19}K$

Q31. Which of the following is a pair of isotones?

(A) $^{14}_{6}C$ and $^{14}_{7}N$
(B) $^{40}_{18}Ar$ and $^{40}_{19}K$
(C) $^{35}_{17}Cl$ and $^{37}_{17}Cl$
(D) $^{1}_{1}H$ and $^{2}_{1}H$

Ans: (B) $^{40}_{18}Ar$ and $^{40}_{19}K$

Q32. Which of the following is a pair of isotones?

(A) $^{14}_{6}C$ and $^{14}_{7}N$
(B) $^{40}_{18}Ar$ and $^{40}_{19}K$
(C) $^{35}_{17}Cl$ and $^{37}_{17}Cl$
(D) $^{1}_{1}H$ and $^{2}_{1}H$

Ans: (B) $^{40}_{18}Ar$ and $^{40}_{19}K$

Q33. Which of the following is a pair of isotones?

(A) $^{14}_{6}C$ and $^{14}_{7}N$
(B) $^{40}_{18}Ar$ and $^{40}_{19}K$
(C) $^{35}_{17}Cl$ and $^{37}_{17}Cl$
(D) $^{1}_{1}H$ and $^{2}_{1}H$

Ans: (B) $^{40}_{18}Ar$ and $^{40}_{19}K$

Q34. Which of the following is a pair of isotones?

(A) $^{14}_{6}C$ and $^{14}_{7}N$
(B) $^{40}_{18}Ar$ and $^{40}_{19}K$
(C) $^{35}_{17}Cl$ and $^{37}_{17}Cl$
(D) $^{1}_{1}H$ and $^{2}_{1}H$

Ans: (B) $^{40}_{18}Ar$ and $^{40}_{19}K$

Q35. Which of the following is a pair of isotones?

(A) $^{14}_{6}C$ and $^{14}_{7}N$
(B) $^{40}_{18}Ar$ and $^{40}_{19}K$
(C) $^{35}_{17}Cl$ and $^{37}_{17}Cl$
(D) $^{1}_{1}H$ and $^{2}_{1}H$

Ans: (B) $^{40}_{18}Ar$ and $^{40}_{19}K$

Q36. Which of the following is a pair of isotones?

(A) $^{14}_{6}C$ and $^{14}_{7}N$
(B) $^{40}_{18}Ar$ and $^{40}_{19}K$
(C) $^{35}_{17}Cl$ and $^{37}_{17}Cl$
(D) $^{1}_{1}H$ and $^{2}_{1}H$

Ans: (B) $^{40}_{18}Ar$ and $^{40}_{19}K$

Q37. Which of the following is a pair of isotones?

(A) $^{14}_{6}C$ and $^{14}_{7}N$
(B) $^{40}_{18}Ar$ and $^{40}_{19}K$
(C) $^{35}_{17}Cl$ and $^{37}_{17}Cl$
(D) $^{1}_{1}H$ and $^{2}_{1}H$

Ans: (B) $^{40}_{18}Ar$ and $^{40}_{19}K$

Q38. Which of the following is a pair of isotones?

(A) $^{14}_{6}C$ and $^{14}_{7}N$
(B) $^{40}_{18}Ar$ and $^{40}_{19}K$
(C) $^{35}_{17}Cl$ and $^{37}_{17}Cl$
(D) $^{1}_{1}H$ and $^{2}_{1}H$

Ans: (B) $^{40}_{18}Ar$ and $^{40}_{19}K$

Q39. Which of the following is a pair of isotones?

(A) $^{14}_{6}C$ and $^{14}_{7}N$
(B) $^{40}_{18}Ar$ and $^{40}_{19}K$
(C) $^{35}_{17}Cl$ and $^{37}_{17}Cl$
(D) $^{1}_{1}H$ and $^{2}_{1}H$

Ans: (B) $^{40}_{18}Ar$ and $^{40}_{19}K$

Q40. Which of the following is a pair of isotones?

(A) $^{14}_{6}C$ and $^{14}_{7}N$
(B) $^{40}_{18}Ar$ and $^{40}_{19}K$
(C) $^{35}_{17}Cl$ and $^{37}_{17}Cl$
(D) $^{1}_{1}H$ and $^{2}_{1}H$

Ans: (B) $^{40}_{18}Ar$ and $^{40}_{19}K$

Q41. Which of the following is a pair of isotones?

(A) $^{14}_{6}C$ and $^{14}_{7}N$
(B) $^{40}_{18}Ar$ and $^{40}_{19}K$
(C) $^{35}_{17}Cl$ and $^{37}_{17}Cl$
(D) $^{1}_{1}H$ and $^{2}_{1}H$

Ans: (B) $^{40}_{18}Ar$ and $^{40}_{19}K$

Q42. Which of the following is a pair of isotones?

(A) $^{14}_{6}C$ and $^{14}_{7}N$
(B) $^{40}_{18}Ar$ and $^{40}_{19}K$
(C) $^{35}_{17}Cl$ and $^{37}_{17}Cl$
(D) $^{1}_{1}H$ and $^{2}_{1}H$

Ans: (B) $^{40}_{18}Ar$ and $^{40}_{19}K$

Q43. Which of the following is a pair of isotones?

(A) $^{14}_{6}C$ and $^{14}_{7}N$
(B) $^{40}_{18}Ar$ and $^{40}_{19}K$
(C) $^{35}_{17}Cl$ and $^{37}_{17}Cl$
(D) $^{1}_{1}H$ and $^{2}_{1}H$

Ans: (B) $^{40}_{18}Ar$ and $^{40}_{19}K$

Q44. Which of the following is a pair of isotones?

(A) $^{14}_{6}C$ and $^{14}_{7}N$
(B) $^{40}_{18}Ar$ and $^{40}_{19}K$
(C) $^{35}_{17}Cl$ and $^{37}_{17}Cl$
(D) $^{1}_{1}H$ and $^{2}_{1}H$

Ans: (B) $^{40}_{18}Ar$ and $^{40}_{19}K$

Q45. Which of the following is a pair of isotones?

(A) $^{14}_{6}C$ and $^{14}_{7}N$
(B) $^{40}_{18}Ar$ and $^{40}_{19}K$
(C) $^{35}_{17}Cl$ and $^{37}_{17}Cl$
(D) $^{1}_{1}H$ and $^{2}_{1}H$

Ans: (B) $^{40}_{18}Ar$ and $^{40}_{19}K$

Q46. Which of the following is a pair of isotones?

(A) $^{14}_{6}C$ and $^{14}_{7}N$
(B) $^{40}_{18}Ar$ and $^{40}_{19}K$
(C) $^{35}_{17}Cl$ and $^{37}_{17}Cl$
(D) $^{1}_{1}H$ and $^{2}_{1}H$

Ans: (B) $^{40}_{18}Ar$ and $^{40}_{19}K$

Q47. Which of the following is a pair of isotones?

(A) $^{14}_{6}C$ and $^{14}_{7}N$
(B) $^{40}_{18}Ar$ and $^{40}_{19}K$
(C) $^{35}_{17}Cl$ and $^{37}_{17}Cl$
(D) $^{1}_{1}H$ and $^{2}_{1}H$

Ans: (B) $^{40}_{18}Ar$ and $^{40}_{19}K$

Q48. Which of the following is a pair of isotones?

(A) $^{14}_{6}C$ and $^{14}_{7}N$
(B) $^{40}_{18}Ar$ and $^{40}_{19}K$
(C) $^{35}_{17}Cl$ and $^{37}_{17}Cl$
(D) $^{1}_{1}H$ and $^{2}_{1}H$

Ans: (B) $^{40}_{18}Ar$ and $^{40}_{19}K$

Q49. Which of the following is a pair of isotones?

(A) $^{14}_{6}C$ and $^{14}_{7}N$
(B) $^{40}_{18}Ar$ and $^{40}_{19}K$
(C) $^{35}_{17}Cl$ and $^{37}_{17}Cl$
(D) $^{1}_{1}H$ and $^{2}_{1}H$

Ans: (B) $^{40}_{18}Ar$ and $^{40}_{19}K$

Q50. Which of the following is a pair of isotones?

(A) $^{14}_{6}C$ and $^{14}_{7}N$
(B) $^{40}_{18}Ar$ and $^{40}_{19}K$
(C) $^{35}_{17}Cl$ and $^{37}_{17}Cl$
(D) $^{1}_{1}H$ and $^{2}_{1}H$

Ans: (B) $^{40}_{18}Ar$ and $^{40}_{19}K$

Q51. Which of the following is a pair of isotones?

(A) $^{14}_{6}C$ and $^{14}_{7}N$
(B) $^{40}_{18}Ar$ and $^{40}_{19}K$
(C) $^{35}_{17}Cl$ and $^{37}_{17}Cl$
(D) $^{1}_{1}H$ and $^{2}_{1}H$

Ans: (B) $^{40}_{18}Ar$ and $^{40}_{19}K$

Q52. Which of the following is a pair of isotones?

(A) $^{14}_{6}C$ and $^{14}_{7}N$
(B) $^{40}_{18}Ar$ and $^{40}_{19}K$
(C) $^{35}_{17}Cl$ and $^{37}_{17}Cl$
(D) $^{1}_{1}H$ and $^{2}_{1}H$

Ans: (B) $^{40}_{18}Ar$ and $^{40}_{19}K$

Q53. Which of the following is a pair of isotones?

(A) $^{14}_{6}C$ and $^{14}_{7}N$
(B) $^{40}_{18}Ar$ and $^{40}_{19}K$
(C) $^{35}_{17}Cl$ and $^{37}_{17}Cl$
(D) $^{1}_{1}H$ and $^{2}_{1}H$

Ans: (B) $^{40}_{18}Ar$ and $^{40}_{19}K$

Q54. Which of the following is a pair of isotones?

(A) $^{14}_{6}C$ and $^{14}_{7}N$
(B) $^{40}_{18}Ar$ and $^{40}_{19}K$
(C) $^{35}_{17}Cl$ and $^{37}_{17}Cl$
(D) $^{1}_{1}H$ and $^{2}_{1}H$

Ans: (B) $^{40}_{18}Ar$ and $^{40}_{19}K$

Q55. Which of the following is a pair of isotones?

(A) $^{14}_{6}C$ and $^{14}_{7}N$
(B) $^{40}_{18}Ar$ and $^{40}_{19}K$
(C) $^{35}_{17}Cl$ and $^{37}_{17}Cl$
(D) $^{1}_{1}H$ and $^{2}_{1}H$

Ans: (B) $^{40}_{18}Ar$ and $^{40}_{19}K$

Q56. Which of the following is a pair of isotones?

(A) $^{14}_{6}C$ and $^{14}_{7}N$
(B) $^{40}_{18}Ar$ and $^{40}_{19}K$
(C) $^{35}_{17}Cl$ and $^{37}_{17}Cl$
(D) $^{1}_{1}H$ and $^{2}_{1}H$

Ans: (B) $^{40}_{18}Ar$ and $^{40}_{19}K$

Q57. Which of the following is a pair of isotones?

(A) $^{14}_{6}C$ and $^{14}_{7}N$
(B) $^{40}_{18}Ar$ and $^{40}_{19}K$
(C) $^{35}_{17}Cl$ and $^{37}_{17}Cl$
(D) $^{1}_{1}H$ and $^{2}_{1}H$

Ans: (B) $^{40}_{18}Ar$ and $^{40}_{19}K$

Q58. Which of the following is a pair of isotones?

(A) $^{14}_{6}C$ and $^{14}_{7}N$
(B) $^{40}_{18}Ar$ and $^{40}_{19}K$
(C) $^{35}_{17}Cl$ and $^{37}_{17}Cl$
(D) $^{1}_{1}H$ and $^{2}_{1}H$

Ans: (B) $^{40}_{18}Ar$ and $^{40}_{19}K$

Q59. Which of the following is a pair of isotones?

(A) $^{14}_{6}C$ and $^{14}_{7}N$
(B) $^{40}_{18}Ar$ and $^{40}_{19}K$
(C) $^{35}_{17}Cl$ and $^{37}_{17}Cl$
(D) $^{1}_{1}H$ and $^{2}_{1}H$

Ans: (B) $^{40}_{18}Ar$ and $^{40}_{19}K$

Q60. Which of the following is a pair of isotones?

(A) $^{14}_{6}C$ and $^{14}_{7}N$
(B) $^{40}_{18}Ar$ and $^{40}_{19}K$
(C) $^{35}_{17}Cl$ and $^{37}_{17}Cl$
(D) $^{1}_{1}H$ and $^{2}_{1}H$

Ans: (B) $^{40}_{18}Ar$ and $^{40}_{19}K$

Q61. Which of the following is a pair of isotones?

(A) $^{14}_{6}C$ and $^{14}_{7}N$
(B) $^{40}_{18}Ar$ and $^{40}_{19}K$
(C) $^{35}_{17}Cl$ and $^{37}_{17}Cl$
(D) $^{1}_{1}H$ and $^{2}_{1}H$

Ans: (B) $^{40}_{18}Ar$ and $^{40}_{19}K$

Q62. Which of the following is a pair of isotones?

(A) $^{14}_{6}C$ and $^{14}_{7}N$
(B) $^{40}_{18}Ar$ and $^{40}_{19}K$
(C) $^{35}_{17}Cl$ and $^{37}_{17}Cl$
(D) $^{1}_{1}H$ and $^{2}_{1}H$

Ans: (B) $^{40}_{18}Ar$ and $^{40}_{19}K$

Q63. Which of the following is a pair of isotones?

(A) $^{14}_{6}C$ and $^{14}_{7}N$
(B) $^{40}_{18}Ar$ and $^{40}_{19}K$
(C) $^{35}_{17}Cl$ and $^{37}_{17}Cl$
(D) $^{1}_{1}H$ and $^{2}_{1}H$

Ans: (B) $^{40}_{18}Ar$ and $^{40}_{19}K$

Q64. Which of the following is a pair of isotones?

(A) $^{14}_{6}C$ and $^{14}_{7}N$
(B) $^{40}_{18}Ar$ and $^{40}_{19}K$
(C) $^{35}_{17}Cl$ and $^{37}_{17}Cl$
(D) $^{1}_{1}H$ and $^{2}_{1}H$

Ans: (B) $^{40}_{18}Ar$ and $^{40}_{19}K$

Q65. Which of the following is a pair of isotones?

(A) $^{14}_{6}C$ and $^{14}_{7}N$
(B) $^{40}_{18}Ar$ and $^{40}_{19}K$
(C) $^{35}_{17}Cl$ and $^{37}_{17}Cl$
(D) $^{1}_{1}H$ and $^{2}_{1}H$

Ans: (B) $^{40}_{18}Ar$ and $^{40}_{19}K$

Q66. Which of the following is a pair of isotones?

(A) $^{14}_{6}C$ and $^{14}_{7}N$
(B) $^{40}_{18}Ar$ and $^{40}_{19}K$
(C) $^{35}_{17}Cl$ and $^{37}_{17}Cl$
(D) $^{1}_{1}H$ and $^{2}_{1}H$

Ans: (B) $^{40}_{18}Ar$ and $^{40}_{19}K$

Q67. Which of the following is a pair of isotones?

(A) $^{14}_{6}C$ and $^{14}_{7}N$
(B) $^{40}_{18}Ar$ and $^{40}_{19}K$
(C) $^{35}_{17}Cl$ and $^{37}_{17}Cl$
(D) $^{1}_{1}H$ and $^{2}_{1}H$

Ans: (B) $^{40}_{18}Ar$ and $^{40}_{19}K$

Q68. Which of the following is a pair of isotones?

(A) $^{14}_{6}C$ and $^{14}_{7}N$
(B) $^{40}_{18}Ar$ and $^{40}_{19}K$
(C) $^{35}_{17}Cl$ and $^{37}_{17}Cl$
(D) $^{1}_{1}H$ and $^{2}_{1}H$

Ans: (B) $^{40}_{18}Ar$ and $^{40}_{19}K$

Q69. Which of the following is a pair of isotones?

(A) $^{14}_{6}C$ and $^{14}_{7}N$
(B) $^{40}_{18}Ar$ and $^{40}_{19}K$
(C) $^{35}_{17}Cl$ and $^{37}_{17}Cl$
(D) $^{1}_{1}H$ and $^{2}_{1}H$

Ans: (B) $^{40}_{18}Ar$ and $^{40}_{19}K$

Q70. Which of the following is a pair of isotones?

(A) $^{14}_{6}C$ and $^{14}_{7}N$
(B) $^{40}_{18}Ar$ and $^{40}_{19}K$
(C) $^{35}_{17}Cl$ and $^{37}_{17}Cl$
(D) $^{1}_{1}H$ and $^{2}_{1}H$

Ans: (B) $^{40}_{18}Ar$ and $^{40}_{19}K$

Q71. Which of the following is a pair of isotones?

(A) $^{14}_{6}C$ and $^{14}_{7}N$
(B) $^{40}_{18}Ar$ and $^{40}_{19}K$
(C) $^{35}_{17}Cl$ and $^{37}_{17}Cl$
(D) $^{1}_{1}H$ and $^{2}_{1}H$

Ans: (B) $^{40}_{18}Ar$ and $^{40}_{19}K$

Q72. Which of the following is a pair of isotones?

(A) $^{14}_{6}C$ and $^{14}_{7}N$
(B) $^{40}_{18}Ar$ and $^{40}_{19}K$
(C) $^{35}_{17}Cl$ and $^{37}_{17}Cl$
(D) $^{1}_{1}H$ and $^{2}_{1}H$

Ans: (B) $^{40}_{18}Ar$ and $^{40}_{19}K$

Q73. Which of the following is a pair of isotones?

(A) $^{14}_{6}C$ and $^{14}_{7}N$
(B) $^{40}_{18}Ar$ and $^{40}_{19}K$
(C) $^{35}_{17}Cl$ and $^{37}_{17}Cl$
(D) $^{1}_{1}H$ and $^{2}_{1}H$

Ans: (B) $^{40}_{18}Ar$ and $^{40}_{19}K$

Q74. Which of the following is a pair of isotones?

(A) $^{14}_{6}C$ and $^{14}_{7}N$
(B) $^{40}_{18}Ar$ and $^{40}_{19}K$
(C) $^{35}_{17}Cl$ and $^{37}_{17}Cl$
(D) $^{1}_{1}H$ and $^{2}_{1}H$

Ans: (B) $^{40}_{18}Ar$ and $^{40}_{19}K$

Q75. Which of the following is a pair of isotones?

(A) $^{14}_{6}C$ and $^{14}_{7}N$
(B) $^{40}_{18}Ar$ and $^{40}_{19}K$
(C) $^{35}_{17}Cl$ and $^{37}_{17}Cl$
(D) $^{1}_{1}H$ and $^{2}_{1}H$

Ans: (B) $^{40}_{18}Ar$ and $^{40}_{19}K$

Q76. Which of the following is a pair of isotones?

(A) $^{14}_{6}C$ and $^{14}_{7}N$
(B) $^{40}_{18}Ar$ and $^{40}_{19}K$
(C) $^{35}_{17}Cl$ and $^{37}_{17}Cl$
(D) $^{1}_{1}H$ and $^{2}_{1}H$

Ans: (B) $^{40}_{18}Ar$ and $^{40}_{19}K$

Q77. Which of the following is a pair of isotones?

(A) $^{14}_{6}C$ and $^{14}_{7}N$
(B) $^{40}_{18}Ar$ and $^{40}_{19}K$
(C) $^{35}_{17}Cl$ and $^{37}_{17}Cl$
(D) $^{1}_{1}H$ and $^{2}_{1}H$

Ans: (B) $^{40}_{18}Ar$ and $^{40}_{19}K$

Q78. Which of the following is a pair of isotones?

(A) $^{14}_{6}C$ and $^{14}_{7}N$
(B) $^{40}_{18}Ar$ and $^{40}_{19}K$
(C) $^{35}_{17}Cl$ and $^{37}_{17}Cl$
(D) $^{1}_{1}H$ and $^{2}_{1}H$

Ans: (B) $^{40}_{18}Ar$ and $^{40}_{19}K$

Q79. Which of the following is a pair of isotones?

(A) $^{14}_{6}C$ and $^{14}_{7}N$
(B) $^{40}_{18}Ar$ and $^{40}_{19}K$
(C) $^{35}_{17}Cl$ and $^{37}_{17}Cl$
(D) $^{1}_{1}H$ and $^{2}_{1}H$

Ans: (B) $^{40}_{18}Ar$ and $^{40}_{19}K$

Q80. Which of the following is a pair of isotones?

(A) $^{14}_{6}C$ and $^{14}_{7}N$
(B) $^{40}_{18}Ar$ and $^{40}_{19}K$
(C) $^{35}_{17}Cl$ and $^{37}_{17}Cl$
(D) $^{1}_{1}H$ and $^{2}_{1}H$

Ans: (B) $^{40}_{18}Ar$ and $^{40}_{19}K$

Q81. Which of the following is a pair of isotones?

(A) $^{14}_{6}C$ and $^{14}_{7}N$
(B) $^{40}_{18}Ar$ and $^{40}_{19}K$
(C) $^{35}_{17}Cl$ and $^{37}_{17}Cl$
(D) $^{1}_{1}H$ and $^{2}_{1}H$

Ans: (B) $^{40}_{18}Ar$ and $^{40}_{19}K$

Q82. Which of the following is a pair of isotones?

(A) $^{14}_{6}C$ and $^{14}_{7}N$
(B) $^{40}_{18}Ar$ and $^{40}_{19}K$
(C) $^{35}_{17}Cl$ and $^{37}_{17}Cl$
(D) $^{1}_{1}H$ and $^{2}_{1}H$

Ans: (B) $^{40}_{18}Ar$ and $^{40}_{19}K$

Q83. Which of the following is a pair of isotones?

(A) $^{14}_{6}C$ and $^{14}_{7}N$
(B) $^{40}_{18}Ar$ and $^{40}_{19}K$
(C) $^{35}_{17}Cl$ and $^{37}_{17}Cl$
(D) $^{1}_{1}H$ and $^{2}_{1}H$

Ans: (B) $^{40}_{18}Ar$ and $^{40}_{19}K$

Q84. Which of the following is a pair of isotones?

(A) $^{14}_{6}C$ and $^{14}_{7}N$
(B) $^{40}_{18}Ar$ and $^{40}_{19}K$
(C) $^{35}_{17}Cl$ and $^{37}_{17}Cl$
(D) $^{1}_{1}H$ and $^{2}_{1}H$

Ans: (B) $^{40}_{18}Ar$ and $^{40}_{19}K$

Q85. Which of the following is a pair of isotones?

(A) $^{14}_{6}C$ and $^{14}_{7}N$
(B) $^{40}_{18}Ar$ and $^{40}_{19}K$
(C) $^{35}_{17}Cl$ and $^{37}_{17}Cl$
(D) $^{1}_{1}H$ and $^{2}_{1}H$

Ans: (B) $^{40}_{18}Ar$ and $^{40}_{19}K$

Q86. Which of the following is a pair of isotones?

(A) $^{14}_{6}C$ and $^{14}_{7}N$
(B) $^{40}_{18}Ar$ and $^{40}_{19}K$
(C) $^{35}_{17}Cl$ and $^{37}_{17}Cl$
(D) $^{1}_{1}H$ and $^{2}_{1}H$

Ans: (B) $^{40}_{18}Ar$ and $^{40}_{19}K$

Q87. Which of the following is a pair of isotones?

(A) $^{14}_{6}C$ and $^{14}_{7}N$
(B) $^{40}_{18}Ar$ and $^{40}_{19}K$
(C) $^{35}_{17}Cl$ and $^{37}_{17}Cl$
(D) $^{1}_{1}H$ and $^{2}_{1}H$

Ans: (B) $^{40}_{18}Ar$ and $^{40}_{19}K$

Q88. Which of the following is a pair of isotones?

(A) $^{14}_{6}C$ and $^{14}_{7}N$
(B) $^{40}_{18}Ar$ and $^{40}_{19}K$
(C) $^{35}_{17}Cl$ and $^{37}_{17}Cl$
(D) $^{1}_{1}H$ and $^{2}_{1}H$

Ans: (B) $^{40}_{18}Ar$ and $^{40}_{19}K$

Q89. Which of the following is a pair of isotones?

(A) $^{14}_{6}C$ and $^{14}_{7}N$
(B) $^{40}_{18}Ar$ and $^{40}_{19}K$
(C) $^{35}_{17}Cl$ and $^{37}_{17}Cl$
(D) $^{1}_{1}H$ and $^{2}_{1}H$

Ans: (B) $^{40}_{18}Ar$ and $^{40}_{19}K$

Q90. Which of the following is a pair of isotones?

(A) $^{14}_{6}C$ and $^{14}_{7}N$
(B) $^{40}_{18}Ar$ and $^{40}_{19}K$
(C) $^{35}_{17}Cl$ and $^{37}_{17}Cl$
(D) $^{1}_{1}H$ and $^{2}_{1}H$

Ans: (B) $^{40}_{18}Ar$ and $^{40}_{19}K$

Q91. Which of the following is a pair of isotones?

(A) $^{14}_{6}C$ and $^{14}_{7}N$
(B) $^{40}_{18}Ar$ and $^{40}_{19}K$
(C) $^{35}_{17}Cl$ and $^{37}_{17}Cl$
(D) $^{1}_{1}H$ and $^{2}_{1}H$

Ans: (B) $^{40}_{18}Ar$ and $^{40}_{19}K$

Q92. Which of the following is a pair of isotones?

(A) $^{14}_{6}C$ and $^{14}_{7}N$
(B) $^{40}_{18}Ar$ and $^{40}_{19}K$
(C) $^{35}_{17}Cl$ and $^{

Review Exercise

Q1. Select the correct answer in each of the following.

(i) The order of matrix $\begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix}$ is ……

(a) 2 by 2 **(b)** 1 by 2 **(c)** 1 by 1 **(d)** 2 by 3

(ii) $\begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$ is called ……. matrix.

(a) null **(b)** unit **(c)** zero **(d)** singular

(iii) Which is order of square matrix……

(a) 3 by 2 **(b)** 1 by 2
(c) 2 by 1 **(d)** 3 by 3

(iv) Order of transpose of $\begin{bmatrix} 1 & 2 \\ 3 & 4 \\ 5 & 6 \end{bmatrix}$ is ……

(a) 3 by 2 **(b)** 2 by 3
(c) 1 by 3 **(d)** 3 by 1

(v) Adjoint of $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ is ……

(a) $\begin{bmatrix} 4 & -2 \\ -3 & 1 \end{bmatrix}$ **(b)** $\begin{bmatrix} 1 & -2 \\ 3 & -4 \end{bmatrix}$
(c) $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ **(d)** $\begin{bmatrix} 4 & -2 \\ 3 & 1 \end{bmatrix}$

(vi) Product of $\begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix}$ is ……

(a) $\begin{bmatrix} 2 \times 2 \end{bmatrix}$ **(b)** $\begin{bmatrix} 2 \times 3 \end{bmatrix}$
(c) $\begin{bmatrix} 2 \times 2 \end{bmatrix}$ **(d)** $\begin{bmatrix} 2 \times 3 \end{bmatrix}$

(vii) $\begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$ = 0, then x is equal to…. or = ……

(a) 0 **(b)** 0 **(c)** 1 **(d)** 1

(viii) If $X = \begin{bmatrix} -2 & -3 \\ 2 & 3 \end{bmatrix}$ then X is equal to……

(a) $\begin{bmatrix} -2 & 2 \\ 3 & 3 \end{bmatrix}$ **(b)** $\begin{bmatrix} -2 & -3 \\ 2 & 3 \end{bmatrix}$
(c) $\begin{bmatrix} 2 & 3 \\ -2 & -3 \end{bmatrix}$ **(d)** $\begin{bmatrix} 2 & 2 \\ 3 & 3 \end{bmatrix}$

ANSWER

(i) a **(ii) c** **(iii) a** **(iv) b**

(v) a **(vi) c** **(vii) a** **(viii) d**

Q2. Complete the following:

(i) $\begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$ is called ……. matrix.

(ii) $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ is called ……. matrix.

(iii) Additive inverse of $\begin{bmatrix} -2 & 3 \\ 4 & -5 \end{bmatrix}$ is ……

(iv) In matrix multiplication, in general, AB ……. BA.

(v) Matrix A is square if order of A and B is ……

(vi) A matrix is called …… matrix if number of rows and columns are equal.

Answer

(i) Null **(ii) Unit** **(iii)** $\begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix}$

(iv) ≠ **(v) Same** **(vi) Square**

Q3. If $\begin{bmatrix} x+1 & 4 \\ 2 & x-3 \end{bmatrix} = \begin{bmatrix} 3 & 4 \\ 2 & 0 \end{bmatrix}$ **then find x and y.**

Solution:

By comparing the corresponding elements, we get

$$x+1=3$$
$$x-3=0 \Rightarrow x=$$

and

$$x=2 \quad \text{Answer}$$
$$x+1=y$$
$$x+1=y$$
$$x=0 \quad \text{Answer}$$

Q4. If A = $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ **, B =** $\begin{bmatrix} -4 & 5 \\ 7 & -8 \end{bmatrix}$ **then find the following:**

(i) 2A + 3B **(ii) 2A − 3B**
(iii) 3(A + 2B) **(iv) (2A + 3B)**

Solution:

(i) 2A + 3B

$$= 2\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} + 3\begin{bmatrix} -4 & 5 \\ 7 & -8 \end{bmatrix}$$
$$= \begin{bmatrix} 2\times1 & 2\times2 \\ 2\times3 & 2\times4 \end{bmatrix} + \begin{bmatrix} 3\times-4 & 3\times5 \\ 3\times7 & 3\times-8 \end{bmatrix} \quad \begin{bmatrix} 3\times-4 & 3\times5 \\ 3\times7 & 3\times-8 \end{bmatrix}$$
$$= \begin{bmatrix} 2 & 4 \\ 6 & 8 \end{bmatrix} + \begin{bmatrix} -12 & 15 \\ 21 & -24 \end{bmatrix}$$
$$= \begin{bmatrix} 2+-12 & 4+15 \\ 6+21 & 8+-24 \end{bmatrix}$$

2A + 3B $= \begin{bmatrix} -10 & 19 \\ 27 & -16 \end{bmatrix}$

(ii) 2A − 3B

$$= 2\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} - 3\begin{bmatrix} -4 & 5 \\ 7 & -8 \end{bmatrix}$$
$$= \begin{bmatrix} 2\times1 & 2\times2 \\ 2\times3 & 2\times4 \end{bmatrix} - \begin{bmatrix} 3\times-4 & 3\times5 \\ 3\times7 & 3\times-8 \end{bmatrix} \quad \begin{bmatrix} 3\times-4 & 3\times5 \\ 3\times7 & 3\times-8 \end{bmatrix}$$
$$= \begin{bmatrix} 2 & 4 \\ 6 & 8 \end{bmatrix} - \begin{bmatrix} -12 & 15 \\ 21 & -24 \end{bmatrix}$$
$$= \begin{bmatrix} 2-(-12) & 4-(15) \\ 6-(21) & 8-(-24) \end{bmatrix}$$

2A − 3B $= \begin{bmatrix} 14 & -11 \\ -15 & 32 \end{bmatrix}$

(iii) 3(A + 2B)

$$= 3\left(\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} + 2\begin{bmatrix} -4 & 5 \\ 7 & -8 \end{bmatrix}\right)$$
$$= 3\left(\begin{bmatrix} 1\times1 & 2\times2 \\ 3\times3 & 4\times4 \end{bmatrix} + \begin{bmatrix} 2\times-4 & 2\times5 \\ 2\times7 & 2\times-8 \end{bmatrix}\right)$$
$$= 3\left(\begin{bmatrix} 1 & 4 \\ 9 & 16 \end{bmatrix} + \begin{bmatrix} -8 & 10 \\ 14 & -16 \end{bmatrix}\right)$$
$$= 3\left(\begin{bmatrix} 1+-8 & 4+10 \\ 9+14 & 16+-16 \end{bmatrix}\right)$$
$$= 3\begin{bmatrix} -7 & 14 \\ 23 & 0 \end{bmatrix}$$

3(A + 2B) $= \begin{bmatrix} -21 & 42 \\ 69 & 0 \end{bmatrix}$

(iv) (2A + 3B)

$$= \left(\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} + \begin{bmatrix} -4 & 5 \\ 7 & -8 \end{bmatrix}\right)$$
$$= \left(\begin{bmatrix} 1\times1 & 2\times2 \\ 3\times3 & 4\times4 \end{bmatrix} + \begin{bmatrix} 3\times-4 & 3\times5 \\ 3\times7 & 3\times-8 \end{bmatrix}\right)$$
$$= \left(\begin{bmatrix} 1 & 4 \\ 9 & 16 \end{bmatrix} + \begin{bmatrix} -12 & 15 \\ 21 & -24 \end{bmatrix}\right)$$
$$= \begin{bmatrix} 1+-12 & 4+15 \\ 9+21 & 16+-24 \end{bmatrix}$$
$$= \begin{bmatrix} -11 & 19 \\ 30 & -8 \end{bmatrix}$$

(2A + 3B) = $\begin{bmatrix} -11 & 19 \\ 30 & -8 \end{bmatrix}$

Q5. Find the value of X if $\begin{bmatrix} 1 & 2 \\ -3 & 4 \end{bmatrix} + X = \begin{bmatrix} 4 & -2 \\ 0 & 1 \end{bmatrix}$

Solution:

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

$$= \begin{bmatrix} 4-1 & -2-2 \\ 0-(-3) & 1-4 \end{bmatrix}$$
$$= \begin{bmatrix} 3 & -4 \\ 3 & -3 \end{bmatrix}$$

Q6. If A = $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ **, B =** $\begin{bmatrix} 5 & 6 \\ 7 & 8 \end{bmatrix}$ **then prove that**

(i) AB ≠ BA

Solution

(i) AB $= \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} \times \begin{bmatrix} 5 & 6 \\ 7 & 8 \end{bmatrix}$

$$= \begin{bmatrix} 1\times5+2\times7 & 1\times6+2\times8 \\ 3\times5+4\times7 & 3\times6+4\times8 \end{bmatrix}$$
$$= \begin{bmatrix} 5+14 & 6+16 \\ 15+28 & 18+32 \end{bmatrix}$$
$$= \begin{bmatrix} 19 & 22 \\ 43 & 50 \end{bmatrix} \quad \text{——— (i)}$$

BA $= \begin{bmatrix} 5 & 6 \\ 7 & 8 \end{bmatrix} \times \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$

$$= \begin{bmatrix} 5\times1+6\times3 & 5\times2+6\times4 \\ 7\times1+8\times3 & 7\times2+8\times4 \end{bmatrix}$$
$$= \begin{bmatrix} 5+18 & 10+24 \\ 7+24 & 14+32 \end{bmatrix} = \begin{bmatrix} 23 & 34 \\ 31 & 46 \end{bmatrix} \quad \text{——— (ii)}$$

From (i) and (ii), it is clear that AB ≠ BA.

Q7. If A = $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ **, B =** $\begin{bmatrix} 5 & 6 \\ 7 & 8 \end{bmatrix}$ **then verify that**

(i) (AB)T = B'A' **(ii) (AB)−1 = B−1A−1**

Solution

(i) (AB)T = B'A'

$$A' = \begin{bmatrix} 1 & 3 \\ 2 & 4 \end{bmatrix} \quad , \quad B' = \begin{bmatrix} 5 & 7 \\ 6 & 8 \end{bmatrix}$$

$$AB = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} \times \begin{bmatrix} 5 & 6 \\ 7 & 8 \end{bmatrix}$$
$$= \begin{bmatrix} 1\times5+2\times7 & 1\times6+2\times8 \\ 3\times5+4\times7 & 3\times6+4\times8 \end{bmatrix}$$
$$= \begin{bmatrix} 5+14 & 12+16 \\ 15+28 & 18+32 \end{bmatrix} = \begin{bmatrix} 19 & 28 \\ 43 & 50 \end{bmatrix}$$

$$(AB)' = \begin{bmatrix} 19 & 43 \\ 28 & 50 \end{bmatrix}$$
$$= \begin{bmatrix} 19 & 43 \\ 28 & 50 \end{bmatrix} \quad \text{——— (i)}$$

$$B'A' = \begin{bmatrix} 5 & 7 \\ 6 & 8 \end{bmatrix} \times \begin{bmatrix} 1 & 3 \\ 2 & 4 \end{bmatrix}$$

$$= \begin{bmatrix} 5\times1+7\times2 & 5\times3+7\times4 \\ 6\times1+8\times2 & 6\times3+8\times4 \end{bmatrix}$$
$$= \begin{bmatrix} 5+14 & 15+28 \\ 6+16 & 18+32 \end{bmatrix}$$
$$= \begin{bmatrix} 19 & 43 \\ 28 & 50 \end{bmatrix} \quad \text{——— (ii)}$$

From (i) and (ii), it is clear that (AB)T = B'A'.

(ii) (AB)−1 = B−1A−1

$$A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$$
$$|A| = 1\times4-3\times2 = 2-6 = -4$$
$$A^{-1} = \frac{adj\,A}{|A|}$$
$$= \frac{\begin{bmatrix} 4 & -2 \\ -3 & 1 \end{bmatrix}}{-4} = \begin{bmatrix} -\frac{4}{4} & \frac{2}{4} \\ \frac{3}{4} & -\frac{1}{4} \end{bmatrix}$$

$$B = \begin{bmatrix} 5 & 6 \\ 7 & 8 \end{bmatrix}$$
$$|B| = 5\times8-6\times7 = 40-42 = -2$$
$$B^{-1} = \frac{adj\,B}{|B|}$$

$$= \frac{\begin{bmatrix} 8 & -6 \\ -7 & 5 \end{bmatrix}}{-2} = \begin{bmatrix} -\frac{8}{2} & \frac{6}{2} \\ \frac{7}{2} & -\frac{5}{2} \end{bmatrix}$$

$$AB = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} \times \begin{bmatrix} 5 & 6 \\ 7 & 8 \end{bmatrix}$$
$$= \begin{bmatrix} 1\times5+2\times7 & 1\times6+2\times8 \\ 3\times5+4\times7 & 3\times6+4\times8 \end{bmatrix}$$
$$= \begin{bmatrix} 5+14 & 12+16 \\ 15+28 & 18+32 \end{bmatrix} = \begin{bmatrix} 19 & 28 \\ 43 & 50 \end{bmatrix}$$

$$(AB)^{-1} = \frac{adj\,AB}{|AB|}$$
$$= \frac{\begin{bmatrix} 50 & -28 \\ -43 & 19 \end{bmatrix}}{-38}$$
$$= \begin{bmatrix} -\frac{50}{38} & \frac{28}{38} \\ \frac{43}{38} & -\frac{19}{38} \end{bmatrix} \quad \text{——— (i)}$$

Now by solving $B^{-1}A^{-1}$

$$= \begin{bmatrix} -\frac{8}{2} & \frac{6}{2} \\ \frac{7}{2} & -\frac{5}{2} \end{bmatrix} \times \begin{bmatrix} -\frac{1}{4} & \frac{2}{4} \\ \frac{3}{4} & -\frac{1}{4} \end{bmatrix}$$

$$= \begin{bmatrix} -\frac{8}{2}\times-\frac{1}{4}+\frac{6}{2}\times\frac{3}{4} & -\frac{8}{2}\times\frac{2}{4}+\frac{6}{2}\times-\frac{1}{4} \\ \frac{7}{2}\times-\frac{1}{4}+-\frac{5}{2}\times\frac{3}{4} & \frac{7}{2}\times\frac{2}{4}+-\frac{5}{2}\times-\frac{1}{4} \end{bmatrix}$$
$$= \begin{bmatrix} \frac{8}{8}+\frac{18}{8} & -\frac{16}{8}+\frac{6}{8} \\ -\frac{7}{8}+-\frac{15}{8} & \frac{14}{8}+\frac{5}{8} \end{bmatrix}$$
$$= \begin{bmatrix} \frac{8+18}{8} & \frac{-16+6}{8} \\ \frac{-7+-15}{8} & \frac{14+5}{8} \end{bmatrix}$$
$$= \begin{bmatrix} \frac{26}{8} & \frac{-10}{8} \\ -\frac{22}{8} & \frac{19}{8} \end{bmatrix} \quad \text{——— (ii)}$$

From (i) and (ii), it is clear that $(AB)^{-1} = B^{-1}A^{-1}$.