

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Perform the matrix operation.

1) Let $A = \begin{bmatrix} -3 & 1 \\ 0 & 2 \end{bmatrix}$. Find $5A$.

- A) $\begin{bmatrix} -15 & 5 \\ 0 & 10 \end{bmatrix}$ B) $\begin{bmatrix} -15 & 1 \\ 0 & 2 \end{bmatrix}$ C) $\begin{bmatrix} -15 & 5 \\ 0 & 2 \end{bmatrix}$ D) $\begin{bmatrix} 2 & 6 \\ 5 & 7 \end{bmatrix}$

Answer: A

2) Let $B = \begin{bmatrix} -1 & 1 & 7 & -3 \end{bmatrix}$. Find $-4B$.

- A) $\begin{bmatrix} 4 & -4 & -28 & 12 \end{bmatrix}$ B) $\begin{bmatrix} -4 & 4 & 28 & -12 \end{bmatrix}$ C) $\begin{bmatrix} 4 & 1 & 7 & -3 \end{bmatrix}$ D) $\begin{bmatrix} -3 & -1 & 5 & -5 \end{bmatrix}$

Answer: A

3) Let $C = \begin{bmatrix} 6 \\ -2 \\ 10 \end{bmatrix}$. Find $(1/2)C$.

- A) $\begin{bmatrix} 3 \\ -2 \\ 10 \end{bmatrix}$ B) $\begin{bmatrix} 6 \\ -1 \\ 10 \end{bmatrix}$ C) $\begin{bmatrix} 3 \\ -1 \\ 5 \end{bmatrix}$ D) $\begin{bmatrix} 12 \\ -4 \\ 20 \end{bmatrix}$

Answer: C

4) Let $A = \begin{bmatrix} 3 & 3 \\ 2 & 4 \end{bmatrix}$ and $B = \begin{bmatrix} 0 & 4 \\ -1 & 6 \end{bmatrix}$. Find $4A + B$.

- A) $\begin{bmatrix} 12 & 7 \\ 7 & 10 \end{bmatrix}$ B) $\begin{bmatrix} 12 & 16 \\ 7 & 22 \end{bmatrix}$ C) $\begin{bmatrix} 12 & 16 \\ 1 & 10 \end{bmatrix}$ D) $\begin{bmatrix} 12 & 28 \\ 4 & 40 \end{bmatrix}$

Answer: B

5) Let $C = \begin{bmatrix} 1 \\ -3 \\ 2 \end{bmatrix}$ and $D = \begin{bmatrix} -1 \\ 3 \\ -2 \end{bmatrix}$. Find $C - 2D$.

- A) $\begin{bmatrix} -3 \\ 9 \\ -6 \end{bmatrix}$ B) $\begin{bmatrix} -1 \\ 3 \\ -2 \end{bmatrix}$ C) $\begin{bmatrix} 3 \\ -9 \\ 6 \end{bmatrix}$ D) $\begin{bmatrix} 3 \\ -6 \\ 4 \end{bmatrix}$

Answer: C

6) Let $A = \begin{bmatrix} -1 & 2 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 0 \end{bmatrix}$. Find $3A + 4B$.

- A) $\begin{bmatrix} 1 & 6 \end{bmatrix}$ B) $\begin{bmatrix} 2 & 2 \end{bmatrix}$ C) $\begin{bmatrix} -3 & 4 \end{bmatrix}$ D) $\begin{bmatrix} -1 & 4 \end{bmatrix}$

Answer: A

7) Let $A = \begin{bmatrix} 2 & -4 \\ -2 & -5 \\ 3 & 5 \end{bmatrix}$ and $B = \begin{bmatrix} 9 & -8 \\ -6 & -6 \\ -7 & -4 \end{bmatrix}$. Find $A + B$.

- A) $\begin{bmatrix} -7 & 4 \\ 4 & 4 \\ 10 & -4 \end{bmatrix}$ B) $\begin{bmatrix} 11 & -12 \\ -8 & -11 \\ -4 & 1 \end{bmatrix}$ C) $\begin{bmatrix} 11 & -12 \\ 8 & -5 \\ -4 & -1 \end{bmatrix}$ D) $\begin{bmatrix} 11 & -5 \\ -8 & -11 \\ -4 & 1 \end{bmatrix}$

Answer: B

8) Let $A = \begin{bmatrix} -2 & 3 \\ -7 & -2 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & 10 \\ -7 & 6 \end{bmatrix}$. Find $A - B$.

A)

$$\begin{bmatrix} -4 & -7 \\ 0 & -8 \end{bmatrix}$$

Answer: A

B)

$$\begin{bmatrix} 0 & 7 \\ -14 & 8 \end{bmatrix}$$

C)

$$\begin{bmatrix} 4 & -7 \\ -14 & 4 \end{bmatrix}$$

D)

$$\begin{bmatrix} 0 & -7 \\ 0 & -8 \end{bmatrix}$$

9) Let $A = \begin{bmatrix} -3 & 2 \\ 3 & -5 \end{bmatrix}$ and $B = \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$. Find $A + B$.

A)

$$\begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$$

Answer: B

B)

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

C)

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

D) Undefined

Find the matrix product AB , if it is defined.

10) $A = \begin{bmatrix} -1 & 3 \\ 2 & 2 \end{bmatrix}$, $B = \begin{bmatrix} -2 & 0 \\ -1 & 2 \end{bmatrix}$.

A)

$$\begin{bmatrix} 6 & -1 \\ 4 & -6 \end{bmatrix}$$

Answer: C

B)

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

C)

$$\begin{bmatrix} -1 & 6 \\ -6 & 4 \end{bmatrix}$$

D)

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

11) $A = \begin{bmatrix} 0 & -3 \\ 4 & 3 \end{bmatrix}$, $B = \begin{bmatrix} -2 & 0 \\ -1 & 1 \end{bmatrix}$.

A)

$$\begin{bmatrix} 0 & 6 \\ -4 & 3 \end{bmatrix}$$

Answer: C

B)

$$\begin{bmatrix} -3 & 3 \\ -5 & -11 \end{bmatrix}$$

C)

$$\begin{bmatrix} 3 & -3 \\ -11 & 3 \end{bmatrix}$$

D)

$$\begin{bmatrix} -8 & -6 \\ 4 & 6 \end{bmatrix}$$

12) $A = \begin{bmatrix} 3 & -2 \\ 3 & 0 \end{bmatrix}$, $B = \begin{bmatrix} 0 & -2 \\ 4 & 6 \end{bmatrix}$.

A)

$$\begin{bmatrix} 0 & 4 \\ 12 & 0 \end{bmatrix}$$

Answer: C

B)

$$\begin{bmatrix} -18 & -8 \\ -6 & 0 \end{bmatrix}$$

C)

$$\begin{bmatrix} -8 & -18 \\ 0 & -6 \end{bmatrix}$$

D)

$$\begin{bmatrix} -6 & 0 \\ 30 & -8 \end{bmatrix}$$

13) $A = \begin{bmatrix} -1 & 3 \\ 1 & 6 \end{bmatrix}$, $B = \begin{bmatrix} 0 & -2 & 6 \\ 1 & -3 & 2 \end{bmatrix}$.

A)

$$\begin{bmatrix} 3 & 6 & -7 \\ -20 & 0 & 18 \end{bmatrix}$$

Answer: B

B)

$$\begin{bmatrix} 3 & -7 & 0 \\ 6 & -20 & 18 \end{bmatrix}$$

C)

$$\begin{bmatrix} 0 & -6 \\ 18 & 1 \\ -18 & 12 \end{bmatrix}$$

D) AB is undefined.

14) $A = \begin{bmatrix} 3 & -2 & 1 \\ 0 & 4 & -1 \end{bmatrix}$, $B = \begin{bmatrix} 4 & 0 \\ -2 & 2 \end{bmatrix}$.

A)

$$\begin{bmatrix} 12 & -8 & 4 \\ -6 & 12 & -4 \end{bmatrix}$$

B)

$$\begin{bmatrix} 12 & 0 \\ 0 & 8 \end{bmatrix}$$

C) AB is undefined.

D)

$$\begin{bmatrix} 12 & -6 \\ -8 & 12 \\ 4 & -4 \end{bmatrix}$$

Answer: C

15) $A = \begin{bmatrix} 0 & -2 \\ 4 & 3 \end{bmatrix}$, $B = \begin{bmatrix} -1 & 3 & 2 \\ 0 & -3 & 1 \end{bmatrix}$.

A) AB is undefined.

B)

$$\begin{bmatrix} 0 & 6 & -2 \\ -4 & 3 & 11 \end{bmatrix}$$

C)

$$\begin{bmatrix} 0 & -6 & -8 \\ 0 & -9 & 3 \end{bmatrix}$$

D)

$$\begin{bmatrix} 0 & -4 & 6 \\ 3 & -2 & 11 \end{bmatrix}$$

Answer: B

16) $A = \begin{bmatrix} 1 & 3 & -1 \\ 3 & 0 & 5 \end{bmatrix}$, $B = \begin{bmatrix} 3 & 0 \\ -1 & 1 \\ 0 & 5 \end{bmatrix}$.

A) AB is undefined.

B)

$$\begin{bmatrix} -2 & 0 \\ 25 & 9 \end{bmatrix}$$

C)

$$\begin{bmatrix} 3 & -3 & 0 \\ 0 & 0 & 25 \end{bmatrix}$$

D)

$$\begin{bmatrix} 0 & -2 \\ 9 & 25 \end{bmatrix}$$

Answer: D

17) $A = \begin{bmatrix} 1 & 0 \\ 0 & 2 \end{bmatrix}$, $B = \begin{bmatrix} 1 & 2 & -2 \\ 2 & -2 & 2 \end{bmatrix}$.

A)

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

B) AB is undefined.

C)

$$\begin{bmatrix} 1 & 0 & 0 \\ 0 & -4 & 4 \end{bmatrix}$$

D)

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

Answer: A

The sizes of two matrices A and B are given. Find the sizes of the product AB and the product BA, if the products are defined.

18) A is 4×4 , B is 4×4 .

A) AB is 8×4 , BA is 8×4 .

B) AB is 4×4 , BA is 4×4 .

C) AB is 4×8 , BA is 4×8 .

D) AB is 1×1 , BA is 1×1 .

Answer: B

19) A is 2×1 , B is 1×1 .

A) AB is 2×1 , BA is undefined.

B) AB is undefined, BA is 1×2 .

C) AB is 1×2 , BA is 1×1 .

D) AB is 2×2 , BA is 1×1 .

Answer: A

20) A is 1×4 , B is 4×1 .

A) AB is 1×1 , BA is 4×4 .

B) AB is 4×4 , BA is 1×1 .

C) AB is 1×1 , BA is undefined.

D) AB is undefined, BA is 4×4 .

Answer: A

21) A is 2×4 , B is 2×4 .

A) AB is undefined, BA is undefined.

C) AB is 4×2 , BA is 2×4 .

B) AB is 2×4 , BA is 4×2 .

D) AB is 2×2 , BA is 4×4 .

Answer: A

Find the transpose of the matrix.

22) $\begin{bmatrix} 8 & 4 \\ -4 & 0 \\ -7 & 7 \end{bmatrix}$

A)

$$\begin{bmatrix} 8 & -4 & -7 \\ 4 & 0 & 7 \end{bmatrix}$$

B)

$$\begin{bmatrix} 4 & 0 & 7 \\ 8 & -4 & -7 \end{bmatrix}$$

C)

$$\begin{bmatrix} -7 & 7 \\ -4 & 0 \\ 8 & 4 \end{bmatrix}$$

D)

$$\begin{bmatrix} 4 & 8 \\ 0 & -4 \\ 7 & -7 \end{bmatrix}$$

Answer: A

23) $\begin{bmatrix} 7 & 4 & 7 & 4 \\ 0 & -7 & 0 & -7 \end{bmatrix}$

A)

$$\begin{bmatrix} 4 & 7 & 4 & 7 \\ -7 & 0 & -7 & 0 \end{bmatrix}$$

B)

$$\begin{bmatrix} 7 & 0 \\ 4 & -7 \\ 7 & 0 \\ 4 & -7 \end{bmatrix}$$

C)

$$\begin{bmatrix} 0 & 7 \\ -7 & 4 \\ 0 & 7 \\ -7 & 4 \end{bmatrix}$$

D)

$$\begin{bmatrix} 0 & -7 & 0 & -7 \\ 7 & 4 & 7 & 4 \end{bmatrix}$$

Answer: B

Decide whether or not the matrices are inverses of each other.

24) $\begin{bmatrix} 5 & 3 \\ 3 & 2 \end{bmatrix}$ and $\begin{bmatrix} 2 & -3 \\ -3 & 5 \end{bmatrix}$

A) No

B) Yes

Answer: B

25) $\begin{bmatrix} 10 & 1 \\ -1 & 0 \end{bmatrix}$ and $\begin{bmatrix} 0 & 1 \\ -1 & 10 \end{bmatrix}$

A) No

B) Yes

Answer: A

26) $\begin{bmatrix} -2 & 4 \\ 4 & -4 \end{bmatrix}$ and $\begin{bmatrix} \frac{1}{2} & \frac{1}{4} \\ \frac{1}{2} & \frac{1}{4} \end{bmatrix}$

A) Yes

B) No

Answer: B

27) $\begin{bmatrix} -5 & 1 \\ -7 & 1 \end{bmatrix}$ and $\begin{bmatrix} \frac{1}{2} & -\frac{1}{2} \\ \frac{7}{2} & -\frac{5}{2} \end{bmatrix}$

A) No

B) Yes

Answer: B

$$28) \begin{bmatrix} 6 & -5 \\ -3 & 5 \end{bmatrix} \text{ and } \begin{bmatrix} \frac{1}{3} & \frac{1}{3} \\ \frac{1}{5} & \frac{2}{5} \end{bmatrix}$$

A) No

B) Yes

Answer: B

$$29) \begin{bmatrix} 9 & 4 \\ 4 & 4 \end{bmatrix} \text{ and } \begin{bmatrix} -0.2 & 0.2 \\ 0.2 & -0.45 \end{bmatrix}$$

A) Yes

B) No

Answer: B

$$30) \begin{bmatrix} 9 & -2 \\ 7 & -2 \end{bmatrix} \text{ and } \begin{bmatrix} 0.5 & 0.5 \\ -\frac{7}{4} & -\frac{9}{4} \end{bmatrix}$$

A) No

B) Yes

Answer: A

$$31) \begin{bmatrix} -5 & -1 \\ 6 & 0 \end{bmatrix} \text{ and } \begin{bmatrix} 0 & \frac{1}{6} \\ -1 & \frac{5}{6} \end{bmatrix}$$

A) Yes

B) No

Answer: B

$$32) \begin{bmatrix} 2 & -1 & 0 \\ -1 & 1 & -2 \\ 1 & 0 & -1 \end{bmatrix} \text{ and } \begin{bmatrix} 1 & -1 & 2 \\ -3 & -2 & 4 \\ -1 & 1 & 1 \end{bmatrix}$$

A) No

B) Yes

Answer: A

Find the inverse of the matrix, if it exists.

$$33) A = \begin{bmatrix} -3 & -4 \\ 3 & -4 \end{bmatrix}$$

A)

$$\begin{bmatrix} -\frac{1}{8} & \frac{1}{6} \\ -\frac{1}{8} & -\frac{1}{6} \end{bmatrix}$$

B)

$$\begin{bmatrix} -\frac{1}{6} & -\frac{1}{6} \\ \frac{1}{8} & -\frac{1}{8} \end{bmatrix}$$

C)

$$\begin{bmatrix} -\frac{1}{8} & -\frac{1}{8} \\ -\frac{1}{6} & \frac{1}{6} \end{bmatrix}$$

D)

$$\begin{bmatrix} -\frac{1}{6} & \frac{1}{6} \\ -\frac{1}{8} & -\frac{1}{8} \end{bmatrix}$$

Answer: D

$$34) A = \begin{bmatrix} 0 & -5 \\ 6 & 3 \end{bmatrix}$$

A)

$$\begin{bmatrix} 0 & \frac{1}{6} \\ -\frac{1}{5} & \frac{1}{10} \end{bmatrix}$$

B)

$$\begin{bmatrix} \frac{1}{10} & -\frac{1}{6} \\ \frac{1}{5} & 0 \end{bmatrix}$$

C)

$$\begin{bmatrix} -\frac{1}{5} & 0 \\ \frac{1}{10} & \frac{1}{6} \end{bmatrix}$$

D)

$$\begin{bmatrix} \frac{1}{10} & \frac{1}{6} \\ -\frac{1}{5} & 0 \end{bmatrix}$$

Answer: D

$$35) A = \begin{bmatrix} 5 & 0 \\ -4 & -6 \end{bmatrix}$$

A)
$$\begin{bmatrix} \frac{1}{5} & 0 \\ -\frac{2}{15} & -\frac{1}{6} \end{bmatrix}$$

B) A is not invertible

C)
$$\begin{bmatrix} \frac{1}{5} & 0 \\ \frac{2}{15} & -\frac{1}{6} \end{bmatrix}$$

D)
$$\begin{bmatrix} -\frac{1}{6} & 0 \\ -\frac{2}{15} & \frac{1}{5} \end{bmatrix}$$

Answer: A

$$36) A = \begin{bmatrix} -5 & -5 \\ 2 & 2 \end{bmatrix}$$

A)
$$\begin{bmatrix} \frac{2}{21} & \frac{5}{21} \\ -\frac{2}{21} & -\frac{5}{21} \end{bmatrix}$$

B) A is not invertible

C)
$$\begin{bmatrix} -\frac{2}{21} & -\frac{5}{21} \\ \frac{2}{21} & \frac{5}{21} \end{bmatrix}$$

D)
$$\begin{bmatrix} \frac{2}{21} & -\frac{5}{21} \\ \frac{2}{21} & -\frac{5}{21} \end{bmatrix}$$

Answer: B

$$37) A = \begin{bmatrix} 1 & 4 \\ 0 & -6 \end{bmatrix}$$

A)
$$\begin{bmatrix} 0 & -\frac{1}{6} \\ 1 & \frac{2}{3} \end{bmatrix}$$

B)
$$\begin{bmatrix} 1 & -\frac{2}{3} \\ 0 & -\frac{1}{6} \end{bmatrix}$$

C)
$$\begin{bmatrix} 1 & \frac{2}{3} \\ 0 & -\frac{1}{6} \end{bmatrix}$$

D)
$$\begin{bmatrix} -\frac{1}{6} & \frac{2}{3} \\ 0 & 1 \end{bmatrix}$$

Answer: C

$$38) A = \begin{bmatrix} 6 & 3 \\ 3 & 0 \end{bmatrix}$$

A)
$$\begin{bmatrix} 0 & \frac{1}{3} \\ \frac{1}{3} & -\frac{2}{3} \end{bmatrix}$$

B)
$$\begin{bmatrix} -\frac{2}{3} & \frac{1}{3} \\ \frac{1}{3} & 0 \end{bmatrix}$$

C)
$$\begin{bmatrix} \frac{1}{3} & -\frac{2}{3} \\ 0 & \frac{1}{3} \end{bmatrix}$$

D)
$$\begin{bmatrix} 0 & -\frac{1}{3} \\ -\frac{1}{3} & -\frac{2}{3} \end{bmatrix}$$

Answer: A

39)

$$\begin{bmatrix} 1 & 0 & 0 \\ -1 & 1 & 0 \\ 1 & 1 & 1 \end{bmatrix}$$

A)
$$\begin{bmatrix} 1 & -1 & 1 \\ 0 & 1 & -1 \\ 0 & 0 & 1 \end{bmatrix}$$

B)
$$\begin{bmatrix} 1 & 1 & 1 \\ 0 & 1 & 1 \\ 0 & 0 & 1 \end{bmatrix}$$

C)
$$\begin{bmatrix} 1 & 0 & 0 \\ 1 & 1 & 0 \\ -2 & -1 & 1 \end{bmatrix}$$

D)
$$\begin{bmatrix} -1 & 0 & 0 \\ -1 & -1 & 0 \\ -1 & -1 & -1 \end{bmatrix}$$

Answer: C

Solve the system by using the inverse of the coefficient matrix.

40) $6x_1 + 5x_2 = 13$

$5x_1 + 3x_2 = 5$

A) $(-2, 5)$

B) No solution

C) $(-2, -5)$

D) $(5, -2)$

Answer: A

41) $6x_1 + 3x_2 = 0$

$2x_1 = -6$

A) $(6, -3)$

B) $(-3, 6)$

C) No solution

D) $(-3, -6)$

Answer: B

42) $-3x_1 - 2x_2 = 2$

$6x_1 + 4x_2 = 8$

A) $(-2, -2)$

B) $\left(-\frac{2}{3} + \frac{3}{2}x_2, x_2\right)$

C) No solution

D) $(2, 8)$

Answer: C

43) $2x_1 + 6x_2 = 2$

$2x_1 - x_2 = -5$

A) $(-1, 2)$

B) $(2, -1)$

C) $(-2, 1)$

D) $(1, -2)$

Answer: C

44) $2x_1 - 6x_2 = -6$

$3x_1 + 2x_2 = 13$

A) $(-3, -2)$

B) $(-2, -3)$

C) $(3, 2)$

D) $(2, 3)$

Answer: C

45) $10x_1 - 4x_2 = -6$

$6x_1 - x_2 = 2$

A) $(-4, -1)$

B) $(1, 4)$

C) $(4, 1)$

D) $(-1, -4)$

Answer: B

46) $2x_1 - 4x_2 = -2$

$3x_1 + 4x_2 = -23$

A) $(-2, 5)$

B) $(2, 5)$

C) $(-5, -2)$

D) $(5, 2)$

Answer: C

47) $-5x_1 + 3x_2 = 8$

$-2x_1 + 4x_2 = 20$

A) $(2, 6)$

B) $(-6, -2)$

C) $(-2, -6)$

D) $(6, 2)$

Answer: A

Find the inverse of the matrix A, if it exists.

$$48) A = \begin{bmatrix} 5 & -1 & 5 \\ 5 & 0 & 3 \\ 10 & -1 & 8 \end{bmatrix}$$

$$A) A^{-1} = \begin{bmatrix} 5 & 5 & 10 \\ -1 & 0 & -1 \\ 5 & 3 & 8 \end{bmatrix}$$

B) A^{-1} does not exist.

$$C) A^{-1} = \begin{bmatrix} 1 & 0 & \frac{3}{5} \\ 0 & 1 & -2 \\ 0 & 0 & 0 \end{bmatrix}$$

$$D) A^{-1} = \begin{bmatrix} 1 & 0 & \frac{3}{5} \\ 0 & 1 & -2 \\ 0 & \frac{4}{5} & 0 \end{bmatrix}$$

Answer: B

$$49) A = \begin{bmatrix} 1 & 1 & 1 \\ 2 & 1 & 1 \\ 2 & 2 & 3 \end{bmatrix}$$

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

$$B) A^{-1} = \begin{bmatrix} -1 & 1 & 0 \\ 4 & -1 & -1 \\ -2 & 0 & 1 \end{bmatrix}$$

C) A^{-1} does not exist.

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

Answer: B

$$50) A = \begin{bmatrix} 1 & 3 & 2 \\ 1 & 3 & 3 \\ 2 & 7 & 8 \end{bmatrix}$$

$$A) A^{-1} = \begin{bmatrix} 1 & \frac{1}{3} & \frac{1}{2} \\ 1 & \frac{1}{3} & \frac{1}{3} \\ \frac{1}{2} & \frac{1}{7} & \frac{1}{8} \end{bmatrix}$$

$$B) A^{-1} = \begin{bmatrix} -3 & 10 & -3 \\ 2 & -4 & 1 \\ -1 & 1 & 0 \end{bmatrix}$$

$$C) A^{-1} = \begin{bmatrix} -1 & -3 & -2 \\ -1 & -3 & -3 \\ -2 & -7 & -8 \end{bmatrix}$$

D) A^{-1} does not exist.

Answer: B

$$51) A = \begin{bmatrix} 1 & 0 & 8 \\ 1 & 2 & 3 \\ 2 & 5 & 3 \end{bmatrix}$$

$$A) A^{-1} = \begin{bmatrix} -1 & 0 & -8 \\ -1 & -2 & -3 \\ -2 & -5 & -3 \end{bmatrix}$$

C) A^{-1} does not exist.

$$B) A^{-1} = \begin{bmatrix} 1 & 1 & 2 \\ 0 & 2 & 5 \\ 8 & 3 & 3 \end{bmatrix}$$

$$D) A^{-1} = \begin{bmatrix} 9 & -40 & 16 \\ -3 & 13 & -5 \\ -1 & 5 & -2 \end{bmatrix}$$

Answer: D

$$52) A = \begin{bmatrix} 8 & -4 & 2 \\ 11 & -7 & 4 \\ 3 & -3 & 2 \end{bmatrix}$$

$$A) A^{-1} = \begin{bmatrix} 8 & 11 & 3 \\ -4 & -7 & -3 \\ 2 & 4 & 2 \end{bmatrix}$$

B) A^{-1} does not exist.

$$C) A^{-1} = \begin{bmatrix} \frac{2}{11} & \frac{2}{11} & -2 \\ \frac{3}{11} & \frac{8}{7} & 2 \\ \frac{8}{3} & -\frac{2}{3} & \frac{1}{2} \end{bmatrix}$$

$$D) A^{-1} = \begin{bmatrix} \frac{1}{8} & \frac{1}{11} & \frac{1}{2} \\ \frac{1}{11} & -\frac{1}{7} & \frac{1}{4} \\ \frac{1}{3} & -\frac{1}{3} & \frac{1}{2} \end{bmatrix}$$

Answer: B

$$53) A = \begin{bmatrix} 0 & 3 & 3 \\ -1 & 0 & 4 \\ 0 & 7 & 0 \end{bmatrix}$$

A) A^{-1} does not exist.

$$B) A^{-1} = \begin{bmatrix} \frac{4}{3} & 0 & \frac{1}{3} \\ -1 & 0 & 0 \\ -\frac{4}{7} & \frac{1}{7} & -\frac{1}{7} \end{bmatrix}$$

$$C) A^{-1} = \begin{bmatrix} -\frac{4}{3} & -1 & -\frac{4}{7} \\ -\frac{1}{7} & 0 & \frac{1}{7} \\ \frac{1}{3} & 0 & 0 \end{bmatrix}$$

$$D) A^{-1} = \begin{bmatrix} \frac{4}{3} & -1 & -\frac{4}{7} \\ 0 & 0 & \frac{1}{7} \\ \frac{1}{3} & 0 & -\frac{1}{7} \end{bmatrix}$$

Answer: D

Determine whether the matrix is invertible.

$$54) \begin{bmatrix} 2 & 9 \\ 1 & 14 \end{bmatrix}$$

A) No

B) Yes

Answer: B

$$55) \begin{bmatrix} 9 & 5 & -9 \\ 4 & 2 & -4 \\ -3 & 0 & 3 \end{bmatrix}$$

A) No

B) Yes

Answer: A

Identify the indicated submatrix.

$$56) A = \left[\begin{array}{ccc|c} 0 & 1 & -4 & -5 \\ 4 & -1 & 0 & 7 \\ \hline 2 & 5 & -7 & 0 \end{array} \right]. \text{ Find } A_{12}.$$

A) [4]

B) $\begin{bmatrix} -5 \\ 7 \end{bmatrix}$

C) 1

D) [2 5 -7]

Answer: B

$$57) A = \left[\begin{array}{cc|c} 2 & 6 & 1 \\ -2 & 0 & -1 \\ 0 & 3 & -6 \\ \hline 3 & 6 & 3 \end{array} \right]. \text{ Find } A_{21}.$$

A) $\begin{bmatrix} 1 \\ -1 \\ -6 \end{bmatrix}$

B) [-2]

C) [6]

D) [3 6]

Answer: D

Find the matrix product AB for the partitioned matrices.

$$58) A = \left[\begin{array}{cc|c} 4 & 0 & 1 \\ 2 & -1 & -3 \\ 5 & 3 & 7 \end{array} \right], B = \left[\begin{array}{ccc|c} -2 & 0 & 8 & 5 \\ 1 & 6 & 2 & 2 \\ \hline 4 & -1 & 0 & 3 \end{array} \right]$$

A)

$$\left[\begin{array}{ccc|c} -4 & -1 & 32 & 23 \\ -17 & -3 & 14 & -1 \\ \hline 21 & 11 & 46 & 52 \end{array} \right]$$

B)

$$\left[\begin{array}{ccc|c} -8 & 0 & 32 & 20 \\ -5 & -6 & 14 & 8 \\ -7 & 18 & 46 & 31 \end{array} \right]$$

C)

$$\left[\begin{array}{ccc|c} -4 & -1 & 0 & 3 \\ -12 & -3 & 0 & -9 \\ \hline 28 & -7 & 0 & 21 \end{array} \right]$$

D)

$$\left[\begin{array}{ccc|c} -4 & -1 & 32 & 23 \\ -17 & -3 & 14 & -1 \\ 21 & 11 & 46 & 52 \end{array} \right]$$

Answer: D

$$59) A = \begin{bmatrix} 0 & I \\ I & F \end{bmatrix}, B = \begin{bmatrix} W & X \\ Y & Z \end{bmatrix}$$

$$A) \begin{bmatrix} Y & Z \\ W + YF & X + ZF \end{bmatrix}$$

$$B) \begin{bmatrix} X & W + XF \\ Z & Y + ZF \end{bmatrix}$$

$$C) \begin{bmatrix} 0 & Z \\ FY & FZ \end{bmatrix}$$

$$D) \begin{bmatrix} Y & Z \\ W + FY & X + FZ \end{bmatrix}$$

Answer: D

Solve the equation $Ax = b$ by using the LU factorization given for A.

$$60) A = \begin{bmatrix} 3 & -1 & 2 \\ -6 & 4 & -5 \\ 9 & 5 & 6 \end{bmatrix}, \mathbf{b} = \begin{bmatrix} 6 \\ -3 \\ 2 \end{bmatrix}$$

$$A = \begin{bmatrix} 1 & 0 & 0 \\ -2 & 1 & 0 \\ 3 & 4 & 1 \end{bmatrix} \begin{bmatrix} 3 & -1 & 2 \\ 0 & 2 & -1 \\ 0 & 0 & 4 \end{bmatrix}$$

$$A) \mathbf{x} = \begin{bmatrix} 22 \\ -7 \\ 15 \end{bmatrix}$$

$$B) \mathbf{x} = \begin{bmatrix} 25 \\ -58 \\ 51 \end{bmatrix}$$

$$C) \mathbf{x} = \begin{bmatrix} 49 \\ -38 \\ 32 \end{bmatrix}$$

$$D) \mathbf{x} = \begin{bmatrix} 10 \\ -2 \\ -13 \end{bmatrix}$$

Answer: D

$$61) A = \begin{bmatrix} 1 & 2 & 4 & 3 \\ -1 & -3 & -1 & -4 \\ 2 & 1 & 19 & 3 \\ 1 & 5 & -9 & 7 \end{bmatrix}, \mathbf{b} = \begin{bmatrix} 2 \\ 0 \\ 4 \\ 3 \end{bmatrix}$$

$$A = \begin{bmatrix} 1 & 0 & 0 & 0 \\ -1 & 1 & 0 & 0 \\ 2 & 3 & 1 & 0 \\ 1 & -3 & -2 & 1 \end{bmatrix} \begin{bmatrix} 1 & 2 & 4 & 3 \\ 0 & -1 & 3 & -1 \\ 0 & 0 & 2 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

$$A) \mathbf{x} = \begin{bmatrix} 27 \\ 9 \\ 8 \\ -3 \end{bmatrix}$$

$$B) \mathbf{x} = \begin{bmatrix} 27 \\ -18 \\ 89 \\ -13 \end{bmatrix}$$

$$C) \mathbf{x} = \begin{bmatrix} 2 \\ -2 \\ 8 \\ -3 \end{bmatrix}$$

$$D) \mathbf{x} = \begin{bmatrix} 41 \\ -6 \\ -3 \\ -5 \end{bmatrix}$$

Answer: D

Find an LU factorization of the matrix A.

$$62) A = \begin{bmatrix} 4 & -1 \\ -24 & 9 \end{bmatrix}$$

$$A) A = \begin{bmatrix} 1 & 0 \\ -6 & 1 \end{bmatrix} \begin{bmatrix} 4 & -1 \\ 0 & 3 \end{bmatrix}$$

$$C) A = \begin{bmatrix} 1 & 0 \\ -6 & 1 \end{bmatrix} \begin{bmatrix} 4 & 1 \\ 0 & -3 \end{bmatrix}$$

$$B) A = \begin{bmatrix} 1 & 0 \\ 4 & 1 \end{bmatrix} \begin{bmatrix} -6 & -1 \\ 0 & 3 \end{bmatrix}$$

$$D) A = \begin{bmatrix} 1 & 0 \\ 6 & 1 \end{bmatrix} \begin{bmatrix} -4 & -1 \\ 0 & -3 \end{bmatrix}$$

Answer: A

$$63) A = \begin{bmatrix} 2 & 3 & 5 \\ 4 & 9 & 5 \\ 4 & -3 & 24 \end{bmatrix}$$

$$A) A = \begin{bmatrix} 1 & 0 & 0 \\ 4 & 1 & 0 \\ 4 & -3 & 1 \end{bmatrix} \begin{bmatrix} 2 & 3 & 5 \\ 0 & 3 & -5 \\ 0 & 0 & -1 \end{bmatrix}$$

$$B) A = \begin{bmatrix} 1 & 0 & 0 \\ 4 & 1 & 0 \\ 4 & -3 & 1 \end{bmatrix} \begin{bmatrix} 2 & 3 & 5 \\ 0 & 9 & 5 \\ 0 & 0 & 24 \end{bmatrix}$$

$$C) A = \begin{bmatrix} 1 & 0 & 0 \\ 2 & 1 & 0 \\ 2 & -3 & 1 \end{bmatrix} \begin{bmatrix} 3 & 3 & 5 \\ 0 & -3 & 5 \\ 0 & 0 & 1 \end{bmatrix}$$

$$D) A = \begin{bmatrix} 1 & 0 & 0 \\ 2 & 1 & 0 \\ 2 & -3 & 1 \end{bmatrix} \begin{bmatrix} 2 & 3 & 5 \\ 0 & 3 & -5 \\ 0 & 0 & -1 \end{bmatrix}$$

Answer: D

Determine the production vector x that will satisfy demand in an economy with the given consumption matrix C and final demand vector d . Round production levels to the nearest whole number.

$$64) C = \begin{bmatrix} .4 & .3 \\ .1 & .6 \end{bmatrix}, d = \begin{bmatrix} 52 \\ 74 \end{bmatrix}$$

$$A) x = \begin{bmatrix} 205 \\ 236 \end{bmatrix}$$

$$B) x = \begin{bmatrix} 4 \\ 24 \end{bmatrix}$$

$$C) x = \begin{bmatrix} 43 \\ 4 \end{bmatrix}$$

$$D) x = \begin{bmatrix} 43 \\ 50 \end{bmatrix}$$

Answer: A

$$65) C = \begin{bmatrix} .2 & .1 & .1 \\ .3 & .2 & .3 \\ .4 & .1 & .3 \end{bmatrix}, d = \begin{bmatrix} 213 \\ 323 \\ 298 \end{bmatrix}$$

$$A) x = \begin{bmatrix} 108 \\ 105 \\ 91 \end{bmatrix}$$

$$B) x = \begin{bmatrix} 482 \\ 895 \\ 829 \end{bmatrix}$$

$$C) x = \begin{bmatrix} 105 \\ 218 \\ 207 \end{bmatrix}$$

$$D) x = \begin{bmatrix} 728 \\ 978 \\ -302 \end{bmatrix}$$

Answer: B

Solve the problem.

66) Compute the matrix of the transformation that performs the shear transformation $x \rightarrow Ax$ for $A = \begin{bmatrix} 1 & 0.20 \\ 0 & 1 \end{bmatrix}$ and then scales all x -coordinates by a factor of 0.61.

$$A) \begin{bmatrix} 1.61 & 0.20 \\ 0 & 2 \end{bmatrix}$$

$$B) \begin{bmatrix} 1 & 0.20 \\ 0 & 0.61 \end{bmatrix}$$

$$C) \begin{bmatrix} 0.61 & 0.20 \\ 0 & 1 \end{bmatrix}$$

$$D) \begin{bmatrix} 0.61 & 0.122 \\ 0 & 1 \end{bmatrix}$$

Answer: D

67) Compute the matrix of the transformation that performs the shear transformation $x \rightarrow Ax$ for $A = \begin{bmatrix} 1 & 0.25 \\ 0 & 1 \end{bmatrix}$ and then scales all y -coordinates by a factor of 0.68.

$$A) \begin{bmatrix} 1 & 0.17 \\ 0 & 0.68 \end{bmatrix}$$

$$B) \begin{bmatrix} 2 & 0.25 \\ 0 & 1.68 \end{bmatrix}$$

$$C) \begin{bmatrix} 0.68 & 0.17 \\ 0 & 1 \end{bmatrix}$$

$$D) \begin{bmatrix} 1 & 0.25 \\ 0 & 0.68 \end{bmatrix}$$

Answer: D

Find the 3×3 matrix that produces the described transformation, using homogeneous coordinates.

68) $(x, y) \rightarrow (x + 7, y + 4)$

A)

$$\begin{bmatrix} 1 & 0 & 4 \\ 0 & 1 & 7 \\ 0 & 0 & 1 \end{bmatrix}$$

B)

$$\begin{bmatrix} 1 & 0 & 7 \\ 0 & 1 & 4 \\ 0 & 0 & 0 \end{bmatrix}$$

C)

$$\begin{bmatrix} 1 & 0 & 7 \\ 0 & 1 & 4 \\ 0 & 0 & 1 \end{bmatrix}$$

D)

$$\begin{bmatrix} 7 & 0 & 0 \\ 0 & 4 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

Answer: C

69) Reflect through the x -axis

A)

$$\begin{bmatrix} 1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

B)

$$\begin{bmatrix} -1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

C)

$$\begin{bmatrix} -1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

D)

$$\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

Answer: A

Find the 3×3 matrix that produces the described composite 2D transformation, using homogeneous coordinates.

70) Rotate points through 45° and then scale the x -coordinate by 0.6 and the y -coordinate by 0.8.

A)

$$\begin{bmatrix} 0.3\sqrt{2} & 0.3\sqrt{2} & 0 \\ -0.4\sqrt{2} & 0.4\sqrt{2} & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

B)

$$\begin{bmatrix} 0.3 & -0.4\sqrt{2} & 0 \\ 0.3\sqrt{2} & 0.4 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

C)

$$\begin{bmatrix} 0 & -0.6 & 0 \\ 0.8 & 0 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

D)

$$\begin{bmatrix} 0.3\sqrt{2} & -0.3\sqrt{2} & 0 \\ 0.4\sqrt{2} & 0.4\sqrt{2} & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

Answer: D

71) Translate by $(8, 6)$, and then reflect through the line $y = x$.

A)

$$\begin{bmatrix} 0 & 1 & 8 \\ 1 & 0 & 6 \\ 0 & 0 & 1 \end{bmatrix}$$

B)

$$\begin{bmatrix} 0 & 1 & 6 \\ 1 & 0 & 8 \\ 0 & 0 & 1 \end{bmatrix}$$

C)

$$\begin{bmatrix} 0 & 6 & 1 \\ 8 & 0 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

D)

$$\begin{bmatrix} -1 & 0 & -8 \\ 0 & -1 & -6 \\ 0 & 0 & 1 \end{bmatrix}$$

Answer: B

Find the 4×4 matrix that produces the described transformation, using homogeneous coordinates.

72) Translation by the vector $(4, -6, -3)$

A)

$$\begin{bmatrix} 4 & 0 & 0 & 0 \\ 0 & -6 & 0 & 0 \\ 0 & 0 & -3 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

B)

$$\begin{bmatrix} 1 & 0 & 0 & 4 \\ 0 & 1 & 0 & -6 \\ 0 & 0 & 1 & -3 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

C)

$$\begin{bmatrix} 0 & 0 & 0 & 4 \\ 0 & 0 & 0 & -6 \\ 0 & 0 & 0 & -3 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

D)

$$\begin{bmatrix} 1 & 0 & 0 & -4 \\ 0 & 1 & 0 & 6 \\ 0 & 0 & 1 & 3 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

Answer: B

73) Rotation about the y-axis through an angle of 60°

A)

$$\begin{bmatrix} 0.5 & 0 & \sqrt{3}/2 & 0 \\ 0 & 1 & 0 & 0 \\ -\sqrt{3}/2 & 0 & 0.5 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

C)

$$\begin{bmatrix} 0.5 & \sqrt{3}/2 & 0 & 0 \\ -\sqrt{3}/2 & 0.5 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

Answer: A

B)

$$\begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 0.5 & \sqrt{3}/2 & 0 \\ 0 & -\sqrt{3}/2 & 0.5 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

D)

$$\begin{bmatrix} \sqrt{3}/2 & 0 & 0.5 & 0 \\ 0 & 1 & 0 & 0 \\ -0.5 & 0 & \sqrt{3}/2 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

Determine whether \mathbf{b} is in the column space of \mathbf{A} .

$$74) \mathbf{A} = \begin{bmatrix} 1 & 2 & -3 \\ 1 & 4 & -6 \\ -3 & -2 & 5 \end{bmatrix}, \mathbf{b} = \begin{bmatrix} 1 \\ -2 \\ -3 \end{bmatrix}$$

A) No

Answer: B

B) Yes

$$75) \mathbf{A} = \begin{bmatrix} -1 & 0 & 2 \\ 5 & 8 & -10 \\ -3 & -3 & 6 \end{bmatrix}, \mathbf{b} = \begin{bmatrix} -4 \\ 3 \\ 4 \end{bmatrix}$$

A) Yes

Answer: B

B) No

Find a basis for the null space of the matrix.

$$76) \mathbf{A} = \begin{bmatrix} 1 & 0 & -7 & -4 \\ 0 & 1 & 5 & -2 \\ 0 & 0 & 0 & 0 \end{bmatrix}$$

A)

$$\left\{ \begin{bmatrix} 7 \\ -5 \\ 1 \\ 0 \end{bmatrix}, \begin{bmatrix} 4 \\ 2 \\ 0 \\ 1 \end{bmatrix} \right\}$$

Answer: A

B)

$$\left\{ \begin{bmatrix} -7 \\ 5 \\ 1 \\ 0 \end{bmatrix}, \begin{bmatrix} -4 \\ -2 \\ 0 \\ 1 \end{bmatrix} \right\}$$

C)

$$\left\{ \begin{bmatrix} 1 \\ 0 \\ 0 \\ 0 \end{bmatrix}, \begin{bmatrix} 0 \\ 1 \\ 0 \\ 0 \end{bmatrix} \right\}$$

D)

$$\left\{ \begin{bmatrix} 1 \\ 0 \\ -7 \\ -4 \end{bmatrix}, \begin{bmatrix} 0 \\ 1 \\ 5 \\ -2 \end{bmatrix} \right\}$$

$$77) \mathbf{A} = \begin{bmatrix} 1 & 0 & -4 & 0 & -4 \\ 0 & 1 & 2 & 0 & 2 \\ 0 & 0 & 0 & 1 & 1 \\ 0 & 0 & 0 & 0 & 0 \end{bmatrix}$$

A)

$$\left\{ \begin{bmatrix} 4 \\ -2 \\ 1 \\ 0 \\ 0 \end{bmatrix}, \begin{bmatrix} 4 \\ -2 \\ 0 \\ -1 \\ 1 \end{bmatrix} \right\}$$

Answer: A

B)

$$\left\{ \begin{bmatrix} 1 \\ 0 \\ -4 \\ 0 \\ -4 \end{bmatrix}, \begin{bmatrix} 0 \\ 1 \\ 2 \\ 0 \\ 2 \end{bmatrix} \right\}$$

C)

$$\left\{ \begin{bmatrix} 1 \\ 0 \\ 0 \\ 0 \end{bmatrix}, \begin{bmatrix} 0 \\ 1 \\ 0 \\ 0 \end{bmatrix}, \begin{bmatrix} 0 \\ 0 \\ 1 \\ 0 \end{bmatrix} \right\}$$

D)

$$\left\{ \begin{bmatrix} -4 \\ 2 \\ 1 \\ 0 \\ 0 \end{bmatrix}, \begin{bmatrix} -4 \\ 2 \\ 0 \\ -1 \\ 1 \end{bmatrix} \right\}$$

Find a basis for the column space of the matrix.

$$78) B = \begin{bmatrix} 1 & -2 & 5 & -3 \\ 2 & -4 & 13 & -2 \\ -3 & 6 & -15 & 9 \end{bmatrix}$$

A) $\left\{ \begin{bmatrix} 1 \\ 2 \\ -3 \end{bmatrix}, \begin{bmatrix} -2 \\ -4 \\ 6 \end{bmatrix} \right\}$

B) $\left\{ \begin{bmatrix} 1 \\ 2 \\ -3 \end{bmatrix}, \begin{bmatrix} 5 \\ 13 \\ -15 \end{bmatrix} \right\}$

C) $\left\{ \begin{bmatrix} 2 \\ 1 \\ 0 \\ 0 \end{bmatrix}, \begin{bmatrix} \frac{29}{3} \\ 0 \\ -\frac{4}{3} \\ 1 \end{bmatrix} \right\}$

D) $\left\{ \begin{bmatrix} 1 \\ 0 \\ 0 \end{bmatrix}, \begin{bmatrix} 0 \\ 1 \\ 0 \end{bmatrix} \right\}$

Answer: B

$$79) B = \begin{bmatrix} 1 & 0 & -5 & 0 & -3 \\ 0 & 1 & 4 & 0 & 4 \\ 0 & 0 & 0 & 1 & 1 \\ 0 & 0 & 0 & 0 & 0 \end{bmatrix}$$

A) $\left\{ \begin{bmatrix} 1 \\ 0 \\ 0 \\ 0 \end{bmatrix}, \begin{bmatrix} 0 \\ 1 \\ 0 \\ 0 \end{bmatrix}, \begin{bmatrix} -5 \\ 4 \\ 0 \\ 0 \end{bmatrix} \right\}$

B) $\left\{ \begin{bmatrix} 1 \\ 0 \\ 0 \\ 0 \end{bmatrix}, \begin{bmatrix} 0 \\ 1 \\ 0 \\ 0 \end{bmatrix} \right\}$

C) $\left\{ \begin{bmatrix} 5 \\ -4 \\ 1 \\ 0 \\ 0 \end{bmatrix}, \begin{bmatrix} 3 \\ -4 \\ 0 \\ -1 \\ 1 \end{bmatrix} \right\}$

D) $\left\{ \begin{bmatrix} 1 \\ 0 \\ 0 \\ 0 \end{bmatrix}, \begin{bmatrix} 0 \\ 1 \\ 0 \\ 0 \end{bmatrix}, \begin{bmatrix} 0 \\ 0 \\ 1 \\ 0 \end{bmatrix} \right\}$

Answer: D

The vector x is in a subspace H with a basis $\beta = \{b_1, b_2\}$. Find the β -coordinate vector of x .

$$80) b_1 = \begin{bmatrix} 1 \\ -2 \end{bmatrix}, b_2 = \begin{bmatrix} -5 \\ 3 \end{bmatrix}, x = \begin{bmatrix} 22 \\ -16 \end{bmatrix}$$

A) $\begin{bmatrix} 2 \\ -4 \end{bmatrix}$

B) $\begin{bmatrix} -2 \\ 4 \end{bmatrix}$

C) $\begin{bmatrix} -4 \\ 1 \end{bmatrix}$

D) $\begin{bmatrix} -4 \\ 2 \end{bmatrix}$

Answer: A

$$81) b_1 = \begin{bmatrix} 2 \\ -2 \\ 4 \end{bmatrix}, b_2 = \begin{bmatrix} 6 \\ 1 \\ -3 \end{bmatrix}, x = \begin{bmatrix} 6 \\ 8 \\ -18 \end{bmatrix}$$

A) $\begin{bmatrix} -3 \\ 2 \end{bmatrix}$

B) $\begin{bmatrix} -3 \\ 2 \\ 0 \end{bmatrix}$

C) $\begin{bmatrix} 3 \\ -2 \end{bmatrix}$

D) $\begin{bmatrix} 2 \\ -3 \end{bmatrix}$

Answer: A

Determine the rank of the matrix.

$$82) \begin{bmatrix} 1 & -2 & 2 & -3 \\ 2 & -4 & 7 & -2 \\ -3 & 6 & -6 & 9 \end{bmatrix}$$

A) 4

B) 1

C) 3

D) 2

Answer: D

$$83) \begin{bmatrix} 1 & 0 & -4 & 0 & 4 \\ 0 & 1 & -3 & 0 & 4 \\ 0 & 0 & 0 & 1 & 1 \\ 0 & 0 & 0 & 0 & 0 \end{bmatrix}$$

A) 3

B) 4

C) 5

D) 2

Answer: A