Topic: Matrix addition and subtraction

Question: Add the matrices.

$$\begin{bmatrix} 4 & -3 & 6 \\ 8 & 2 & 1 \end{bmatrix} + \begin{bmatrix} 3 & 0 & 1 \\ 11 & 4 & -9 \end{bmatrix}$$

Answer choices:

A $\begin{bmatrix} 4 & -3 & 6 \\ 19 & 6 & -8 \end{bmatrix}$

B $\begin{bmatrix} 7 & -3 & 7 \\ 19 & 6 & -8 \end{bmatrix}$

C $\begin{bmatrix} 7 & -3 & 7 \\ 8 & 2 & 1 \end{bmatrix}$

D $\begin{bmatrix} 7 & 3 & 7 \\ 19 & 6 & 8 \end{bmatrix}$

Solution: B

To add matrices, you simply add together entries from corresponding positions in each matrix.

$$\begin{bmatrix} 4 & -3 & 6 \\ 8 & 2 & 1 \end{bmatrix} + \begin{bmatrix} 3 & 0 & 1 \\ 11 & 4 & -9 \end{bmatrix}$$

$$\begin{bmatrix} 4+3 & -3+0 & 6+1 \\ 8+11 & 2+4 & 1+(-9) \end{bmatrix}$$

$$\begin{bmatrix} 7 & -3 & 7 \\ 19 & 6 & -8 \end{bmatrix}$$

Topic: Matrix addition and subtraction

Question: Subtract the matrices.

$$\begin{bmatrix} 8 & 1 & 3 \\ 6 & -4 & 5 \\ 0 & 1 & 9 \end{bmatrix} - \begin{bmatrix} 6 & 12 & 5 \\ 5 & 1 & 0 \\ -2 & 7 & 2 \end{bmatrix}$$

Answer choices:

A $\begin{bmatrix} 14 & 13 & 8 \\ 1 & 5 & 5 \\ 2 & 6 & 7 \end{bmatrix}$

B $\begin{bmatrix} -2 & 11 & 2 \\ -1 & 5 & -5 \\ -2 & 6 & -7 \end{bmatrix}$

C $\begin{bmatrix} 14 & 13 & 8 \\ 11 & 7 & 5 \\ -2 & 8 & 11 \end{bmatrix}$

D $\begin{bmatrix} 2 & -11 & -2 \\ 1 & -5 & 5 \\ 2 & -6 & 7 \end{bmatrix}$

Solution: D

To subtract matrices, you simply subtract entries from corresponding positions in each matrix.

$$\begin{bmatrix} 8 & 1 & 3 \\ 6 & -4 & 5 \\ 0 & 1 & 9 \end{bmatrix} - \begin{bmatrix} 6 & 12 & 5 \\ 5 & 1 & 0 \\ -2 & 7 & 2 \end{bmatrix}$$

$$\begin{bmatrix} 8-6 & 1-12 & 3-5 \\ 6-5 & -4-1 & 5-0 \\ 0-(-2) & 1-7 & 9-2 \end{bmatrix}$$

$$\begin{bmatrix} 2 & -11 & -2 \\ 1 & -5 & 5 \\ 2 & -6 & 7 \end{bmatrix}$$

Topic: Matrix addition and subtraction

Question: Solve for x.

$$\begin{bmatrix} 8 & 2 \\ 7 & 9 \end{bmatrix} - \begin{bmatrix} 2 & 3 \\ 3 & 1 \end{bmatrix} = x + \begin{bmatrix} 5 & 7 \\ -5 & 9 \end{bmatrix} + \begin{bmatrix} 2 & 0 \\ 6 & -4 \end{bmatrix}$$

Answer choices:

A $x = \begin{bmatrix} 13 & 6 \\ 5 & 13 \end{bmatrix}$

B $x = \begin{bmatrix} -13 & -6 \\ -5 & -13 \end{bmatrix}$

C $x = \begin{bmatrix} -1 & -8 \\ 3 & 3 \end{bmatrix}$

D $x = \begin{bmatrix} 1 & 8 \\ -3 & -3 \end{bmatrix}$

Solution: C

Let's start with the matrix subtraction on the left side of the equation and the matrix addition on the right side of the equation.

$$\begin{bmatrix} 8 & 2 \\ 7 & 9 \end{bmatrix} - \begin{bmatrix} 2 & 3 \\ 3 & 1 \end{bmatrix} = x + \begin{bmatrix} 5 & 7 \\ -5 & 9 \end{bmatrix} + \begin{bmatrix} 2 & 0 \\ 6 & -4 \end{bmatrix}$$

$$\begin{bmatrix} 8-2 & 2-3 \\ 7-3 & 9-1 \end{bmatrix} = x + \begin{bmatrix} 5+2 & 7+0 \\ -5+6 & 9+(-4) \end{bmatrix}$$

$$\begin{bmatrix} 6 & -1 \\ 4 & 8 \end{bmatrix} = x + \begin{bmatrix} 7 & 7 \\ 1 & 5 \end{bmatrix}$$

To isolate x, we'll subtract the matrix on the right from both sides in order to move it to the left.

$$\begin{bmatrix} 6 & -1 \\ 4 & 8 \end{bmatrix} - \begin{bmatrix} 7 & 7 \\ 1 & 5 \end{bmatrix} = x$$

$$\begin{bmatrix} 6-7 & -1-7 \\ 4-1 & 8-5 \end{bmatrix} = x$$

$$\begin{bmatrix} -1 & -8 \\ 3 & 3 \end{bmatrix} = x$$

The conclusion is that the value of x that makes the equation true is this matrix:

$$x = \begin{bmatrix} -1 & -8 \\ 3 & 3 \end{bmatrix}$$