

## Matrix Addition

A matrix is a rectangular array of numbers. A matrix's dimension is in the form *rows x columns*. For example,

$$\begin{bmatrix} 4 & 5 & 3 \\ 2 & 3 & 0 \end{bmatrix}$$

is a 2 x 3 matrix.

Two matrices must have the same dimensions for addition to be possible. If they have different dimensions, whether it be a different number of rows, a different number of columns, or both, the sum of the two matrices is undefined.

To add two matrices, you match up corresponding entries and find the sum of them.

Example:

$$\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} + \begin{bmatrix} 9 & 0 \\ 3 & 2 \end{bmatrix} = \begin{bmatrix} 1+9 & 0+0 \\ 0+3 & 1+2 \end{bmatrix} = \begin{bmatrix} 10 & 0 \\ 3 & 3 \end{bmatrix}$$

Now, try these ones on your own.

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

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

3. 
$$\begin{bmatrix} 1 & 5 \\ -9 & 0 \\ 3 & -4 \end{bmatrix} + \begin{bmatrix} 0 & -1 \\ 2 & 0 \\ 4 & 4 \end{bmatrix} =$$

4. 
$$\begin{bmatrix} -1 & 3 & -7 & -3 \end{bmatrix} + \begin{bmatrix} 4 & -4 & 1 & 4 \end{bmatrix} =$$

5. Can the following matrices be added or not? In each case, write out the dimensions of each matrix in question. If the matrices can be added, then find the sum.

a. 
$$\begin{bmatrix} 4 & 1 & 2 \\ 0 & 2 & 11 \end{bmatrix} + \begin{bmatrix} 1 & 5 \end{bmatrix} =$$

b. 
$$\begin{bmatrix} 1 & 2 \end{bmatrix} + \begin{bmatrix} 1 \\ 2 \end{bmatrix} =$$

c. 
$$\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} + \begin{bmatrix} 1 & 2 \\ 2 & 5 \\ 0 & 1 \end{bmatrix} =$$

d. 
$$\begin{bmatrix} 1 & 5 & 3 \\ 8 & 0 & 2 \end{bmatrix} + \begin{bmatrix} 4 & 2 & 1 \\ 1 & 1 & 0 \end{bmatrix} =$$

$$6. \begin{bmatrix} 2 & -1 & 0 & 0 \\ -6 & -3 & 2 & -3 \end{bmatrix} + \begin{bmatrix} 1 & -4 & 3 & 6 \\ 1 & 0 & -1 & 3 \end{bmatrix} =$$

$$7. \begin{bmatrix} 1 & 3 & 3 \\ -2 & 0 & 1 \end{bmatrix} + \begin{bmatrix} 2 & -8 & 1 \\ 1 & 4 & 2 \end{bmatrix} =$$

$$8. \begin{bmatrix} 1 & 4 \\ 0 & 2 \end{bmatrix} + \begin{bmatrix} 3 & 5 \\ -10 & 3 \end{bmatrix} + \begin{bmatrix} 3 & -4 \\ 2 & 5 \end{bmatrix} =$$

$$9. \begin{bmatrix} 1 & 4 & -12 \\ -3 & -2 & 2 \\ -1 & 1 & 0 \\ 0 & 0 & 3 \end{bmatrix} + \begin{bmatrix} 7 & 4 & 2 \\ 2 & 0 & -1 \\ -1 & 7 & 6 \\ 3 & -3 & 2 \end{bmatrix} =$$

$$10. \begin{bmatrix} 1 & -4 & 3 & 9 \\ 1 & 2 & -1 & 1 \\ 0 & -5 & -3 & -8 \end{bmatrix} + \begin{bmatrix} 2 & 5 & -2 & 2 \\ 9 & 4 & 2 & 1 \\ -4 & 5 & 6 & 3 \end{bmatrix} =$$