# Finding the Sum and Difference of Two Matrices

## Describing Matrices

A **matrix** is a rectangular array of numbers that is usually named by a capital letter. Each entry in a matrix is referred to as , such that represents the row and represents the column. Matrices are often referred to by their dimensions: indicating rows and columns.

Example: Given the matrix

1. What are the dimensions of matrix ?
2. What are the entries at and ?

## Adding and Subtracting Matrices

Since the entries of a matrix are numbers, we can perform operations on matrices. To add or subtract matrices, we simply add or subtract the corresponding entries.

**Adding and Subtracting Matrices**

Given matrices and of like dimensions, addition and subtraction of and will produce matrix or matrix of the same dimension.

such that

such that

\*Note: addition and subtraction of matrices is only possible when the matrices have the same dimensions.

Example

Use the matrices below and perform the matrix addition or subtraction. Indicate if the operation is undefined.

, , ,

# Finding Scalar Multiples of a Matrix

Besides adding and subtracting matrices, we can also multiply a matrix by a constant called a scalar.

**Scalar Multiplication**

Scalar multiplication involves finding the product of a constant by each entry in the matrix. Given

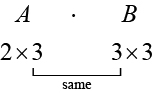
The scalar multiple is

Examples

1. Given the matrix , find .
2. Given and , find the sum .

# Finding the Product of Two Matrices

Finding the product of two matrices is only possible when the inner dimensions are the same, meaning that the number of columns of the first matrix is equal to the number of rows of the second matrix.



If is an matrix and is an matrix, then the product matrix is an matrix. If the inner dimensions do not match, the product is not defined. To multiply matrices, multiply the entries of row of by column in and add.

Examples

Given and ,

* 1. Find .
  2. Find .
  3. Find .