A matrix is numbers arranged in rows and columns.

Think “spreadsheet”. A name from computer programming that may be familiar to you is “array”. Back in the day when I was programming in COBOL we had to arrange our data in “fields”. Essentially, a matrix is one method of organizing and arranging data.

Matrices are often/usually named by capital letters italicized. Some examples would be:

The size of a matrix is stated as “number of rows by number of columns”. Matrix $A$ is a 3 by 1 matrix. $B$ is a $3 \times 3$ matrix. $F$ is a 1 by 4 matrix. $M$ is a $3 \times 4$ matrix.

A square matrix has the same number of rows and columns. The only square matrix above is $B$.

Matrix $F$ is a row matrix (size $1 \times$ something); $A$ is a column matrix (size something $\times$ 1).

Two matrices are equal if and only if they are the same size and have matching corresponding row/column elements. For example:

Example A: Solve for the variables $x$ and $y$.

$$
\begin{bmatrix}
-2 & 7 \\
x-4 & -5
\end{bmatrix} = \begin{bmatrix}
2y-1 & 7 \\
6 & -5
\end{bmatrix}
$$

Calculus 131, section 10.2-10.3a  Addition and Subtraction of Matrices  
Scalar Multiplication of a Matrix
Adding and subtracting matrices is essentially combining like terms: corresponding row/column entries are added together.

Example B. The students in the four 02** discussion sections of the Fall 2011 Math 131 class had the following breakdown of majors and years.

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<th>SO</th>
<th>JR</th>
<th>SR</th>
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<td>3</td>
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</table>

Rewrite this data into matrices $M$, $N$, $P$ and $Q$ where the rows represent majors, columns represent years, and each matrix represents one section.

a) Find $R = M + N + P + Q$ and interpret what it tells us.

b) How many sophomore Biology Science majors are there in the 02** section of the Fall 2011 Math 131 class?

c) How many freshmen are there in the 02** section of the Fall 2011 Math 131 class?

d) How many Letters and Sciences majors are there in the 02** section of the Fall 2011 Math 131 class?
Semi-random notes on matrices:

Any matrices being added *must* be the same size.

Your text introduces the “additive inverse” of a matrix. I’ll talk about this as part of subtraction later on.

A “zero matrix” has elements that are all the number 0.

Now we move over to the first topic in section 10.3.

Multiplying a matrix by a scalar (i.e. constant coefficient) is essentially distribution.

Example C:

Given \( B = \begin{bmatrix} 3 & 1 & 1 \\ 1 & 1 & -1 \\ 2 & 1 & 2 \end{bmatrix} \), find \(-2B\).

Example C extended:

Given \( B = \begin{bmatrix} 3 & 1 & 1 \\ 1 & 1 & -1 \\ 2 & 1 & 2 \end{bmatrix} \) and \( C = \begin{bmatrix} -1 & 2 & -2 \\ 0 & -2 & 1 \\ 3 & 0 & -3 \end{bmatrix} \), find \(3B - 2C\).

I recommend thinking of subtraction as “adding a negative”. Do the scalar multiplication first to make sure that a “minus a negative” isn’t missed.