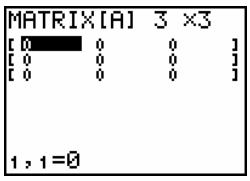
3 Matrices and systems of equations

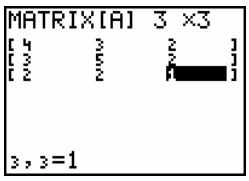
3.1 Matrices

a. Definition of a matrix

The easiest way to define a matrix is via the matrix editor, **MATRX<EDIT>**. You can define ten different matrices, **[A]** through **[J]**, on a **TI-83/84 Plus**. After the selection of the name, you can enter the dimension of the matrix. First enter the number of rows, followed by **ENTER** and then do the same for the numbers of columns. Automatically a matrix of the dimension entered appears with all its elements equal to zero.

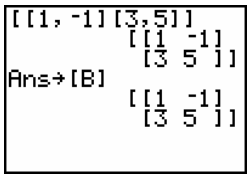
For each element you can enter a number followed by **ENTER**. For example, after you have entered the first element the cursor will jump automatically to the next element to continue the entering. Navigation between the elements is possible by the arrow keys.





If you want to change the dimension or some elements after definition, reopen the matrix in the matrix editor.

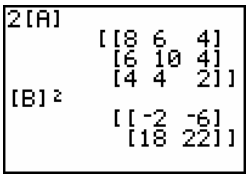
You can also define a matrix from the home screen as follows: **[[1,-1][3,5]]**. The use of matrices in expressions (see next section) and the assignment of a name to a matrix from the home screen has to be done via the sub menu **MATRX<NAMES>**.

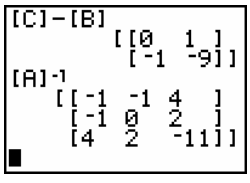


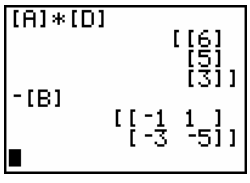
b. Calculations with matrices

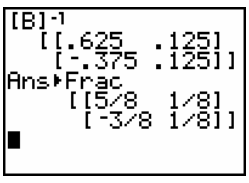
We will illustrate some elementary calculations with the following matrices:

$$A=\begin{bmatrix}4 & 3 & 2\\ 3 & 5 & 2\\ 2 & 2 & 1\end{bmatrix},\quad B=\begin{bmatrix}1 & -1\\ 3 & 5\end{bmatrix},\quad C=\begin{bmatrix}1 & 0\\ 2 & -4\end{bmatrix}\ \text{and}\ D=\begin{bmatrix}1\\ 0\\ 1\end{bmatrix}.$$

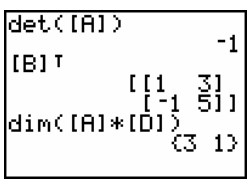


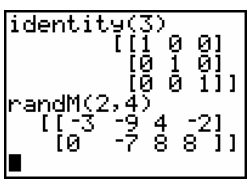






The submenu **MATRX<MATH>** contains several matrix functions. Some examples:

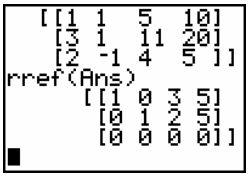




3.2 Systems of equations

The submenu **MATRX<MATH>** contains functions by which we can solve systems of linear equations. An example:

$$\begin{cases} x + y + 5z = 10 \\ 3x + y + 11z = 20 \\ 2x - y + 4z = 5 \end{cases}$$



The command **B:rref(** generates the row reduced echelon form of a matrix (see example above) and **A:ref(** the reduced echelon form. With the commands **C** through **F** (elementary row operations) you can transform a matrix step by step into its reduced echelon form as shown below.