

Matrices on the TI-83 Plus and TI-84 Plus Calculators

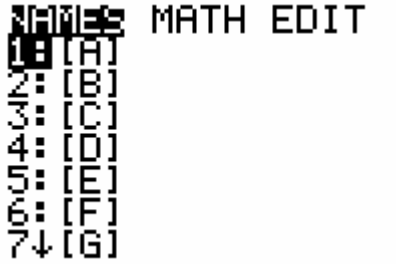
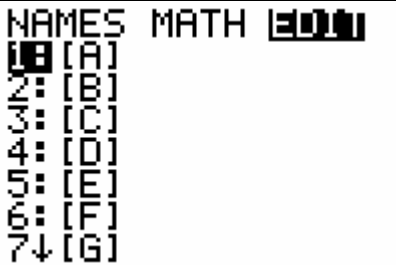
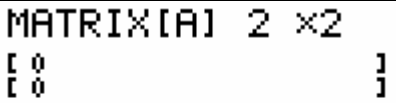
Chapter 3 of this course deals with matrices. Your instructor may require you to use your calculator to perform certain operations. This section provides instruction regarding inputting, performing operations, solving, and deleting matrices.

A. Inputting a Matrix

Consider the following two matrices A and B.

$$A = \begin{bmatrix} -1 & 5 \\ 3 & 8 \end{bmatrix} \quad \text{and} \quad B = \begin{bmatrix} 3 & -4 \\ -2 & 5 \end{bmatrix}.$$

We are going to enter Matrix A and Matrix B in our calculator. Below are the step-by-step instructions.

<p>On your calculator, look at the far left column of buttons. There is a button labeled x^{-1}. Above this button is the command entitled MATRIX (or MATRX). Press the 2nd button and then press the x^{-1} button to gain access to the Matrix menus. After pressing these buttons, your screen should appear as shown.</p>	
<p>At the top of your screen, you'll see the words NAMES, MATH and EDIT. These are names of menus. Use your Right/Left arrow button to highlight the EDIT menu. Highlight the line 1: [A] and press ENTER.</p>	
<p>Enter the dimensions of Matrix A: number of rows then press ENTER; number of columns then press ENTER.</p>	

<p>Enter the elements of Matrix A by highlighting the appropriate cell, typing the number and pressing ENTER. You have now completely entered Matrix A. Notice the cell location at the bottom left corner of your screen.</p>	<p>MATRIX[A] 2 ×2 $\begin{bmatrix} -1 & 5 \\ 3 & 8 \end{bmatrix}$ z, z=8</p>
<p>Now you will enter Matrix B by performing the same steps.</p>	<p>MATRIX[B] 2 ×2 $\begin{bmatrix} 3 & -4 \\ -2 & 5 \end{bmatrix}$ z, z=5</p>
<p>We are ready to use these matrices. We'll first return to our Home Screen by using the QUIT command. This is above the MODE button near the top of your calculator. Press 2nd and MODE to access the QUIT command.</p>	

B. Performing Operations With These Matrices

This section will demonstrate the calculator steps for addition. Other operations can be performed in similar manner.

<p>We can use the calculator to perform operations using these matrices. For instance, we may want to determine A+B. Access the MATRIX command. You should now see the screen displaying the dimensions of Matrices A and B.</p>	<p>MATRIX MATH EDIT 1: [A] 2×2 2: [B] 2×2 3: [C] 4: [D] 5: [E] 6: [F] 7↓ [G]</p>
<p>With Matrix A highlighted, press ENTER. Now press the + button. Press MATRIX again and this time select Matrix B. Once you have [A] + [B] on your screen, press ENTER to get the answer. Your screen should now look as to the right.</p>	<p>[A] + [B] $\begin{bmatrix} 2 & 1 \\ 1 & 13 \end{bmatrix}$</p>

C. Matrices as Systems of Equations

Matrices are also used to denote a system of equations. The below system of equations can be written in matrix form:

$$\begin{array}{l} 3x + 7y = -1 \\ 2x + 5y = -1 \end{array} \longrightarrow \left[\begin{array}{cc|c} 3 & 7 & -1 \\ 2 & 5 & -1 \end{array} \right]$$

We're interested in solving this system of equations (i.e. determining the values of x and y that make both equations true simultaneously). Below are the instructions to have your calculator solve the system of equations in matrix form.

<p>First, we'll input the matrix representing the system of equations in our calculator in the same manner as discussed above. We'll call this matrix [C]. For purposes of the calculator, we ignore the vertical line between columns 2 and 3 in our original matrix.</p>	<pre>MATRIX [C] 2 x3 [[3 7 -1] [2 5 -1] 2, 3 = -1</pre>
<p>We return to our Home Screen by using the QUIT command.</p>	
<p>Now, press MATRIX and Right Arrow to the MATH Menu. Down Arrow to command B: rref.</p>	<pre>NAMES [MATH] EDIT 6:randM(7:augment(8:Matr▶list(9>List▶matr(0:cumSum(A:rref(B:rref(</pre>
<p>Press ENTER to select this command. Your calculator should take you back to the Home Screen with rref(on the command line. Press MATRIX and select Matrix C. Press the Right Parenthesis button, and then press ENTER. Your solution matrix will appear on your screen. This matrix indicates that the solution is $x = 2$ and $y = -1$.</p>	<pre>rref([C]) [[1 0 2] [0 1 -1]]</pre>

D. Deleting Matrices

We want to be able to delete a matrix when we are finished using it. Below are the instructions to delete matrices.

<p>Above the blue + key is a command labeled MEM. Press 2nd and the + key to access the MEM menu. Then highlight 2: Mem Mgmt/Del ... command and press ENTER.</p>	<pre>MEM 1:About 2:Mem Mgmt/Del... 3:Clear Entries 4:ClrAllLists 5:Archive 6:UnArchive 7↓Reset...</pre>
<p>Highlight 5: Matrix and press ENTER.</p>	<pre>RAM FREE 19358 ARC FREE 8582 1:All... 2:Real... 3:Complex... 4>List... 5:Matrix... 6↓Y-Vars...</pre>
<p>We now see a list containing the three matrices we created. We're going to delete each of these. Using your up/down arrow, move the pointer to [A] and press the DEL key (found immediately to the right of the MODE key). The entry for matrix A will be deleted. You can continue in similar manner for matrices B and C.</p>	<pre>RAM FREE 19358 ARC FREE 8582 ▶ [A] 47 [B] 47 [C] 65</pre>