

Array Functions

To make Matrix operations in Excel you must have in mind that:

- Instead of using the **ENTER** (Return) key, you have to use the **CTRL-Shift-ENTER** keys simultaneously. Excel uses this command to know that we are making MATRIX operations.

- List of Commands

	MATRIX OPERATION		
	<i>Multiplication</i>	<i>Determinant</i>	<i>Inverse</i>
Command	+mmult(array1..array2)	+mdeterm(array)	+minverse(array)
Then.....	<i>CTRL-Shift-ENTER</i>	<i>CTRL-Shift-ENTER</i>	<i>CTRL-Shift-ENTER</i>

Matrix Multiplication

Step 1. Set up the matrices: Suppose we have 2 matrices: A and B. We typed them in an excel worksheet as it's shown in Picture 1.

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Arial 10 B I U \$ % , +.0 .00

H10 =

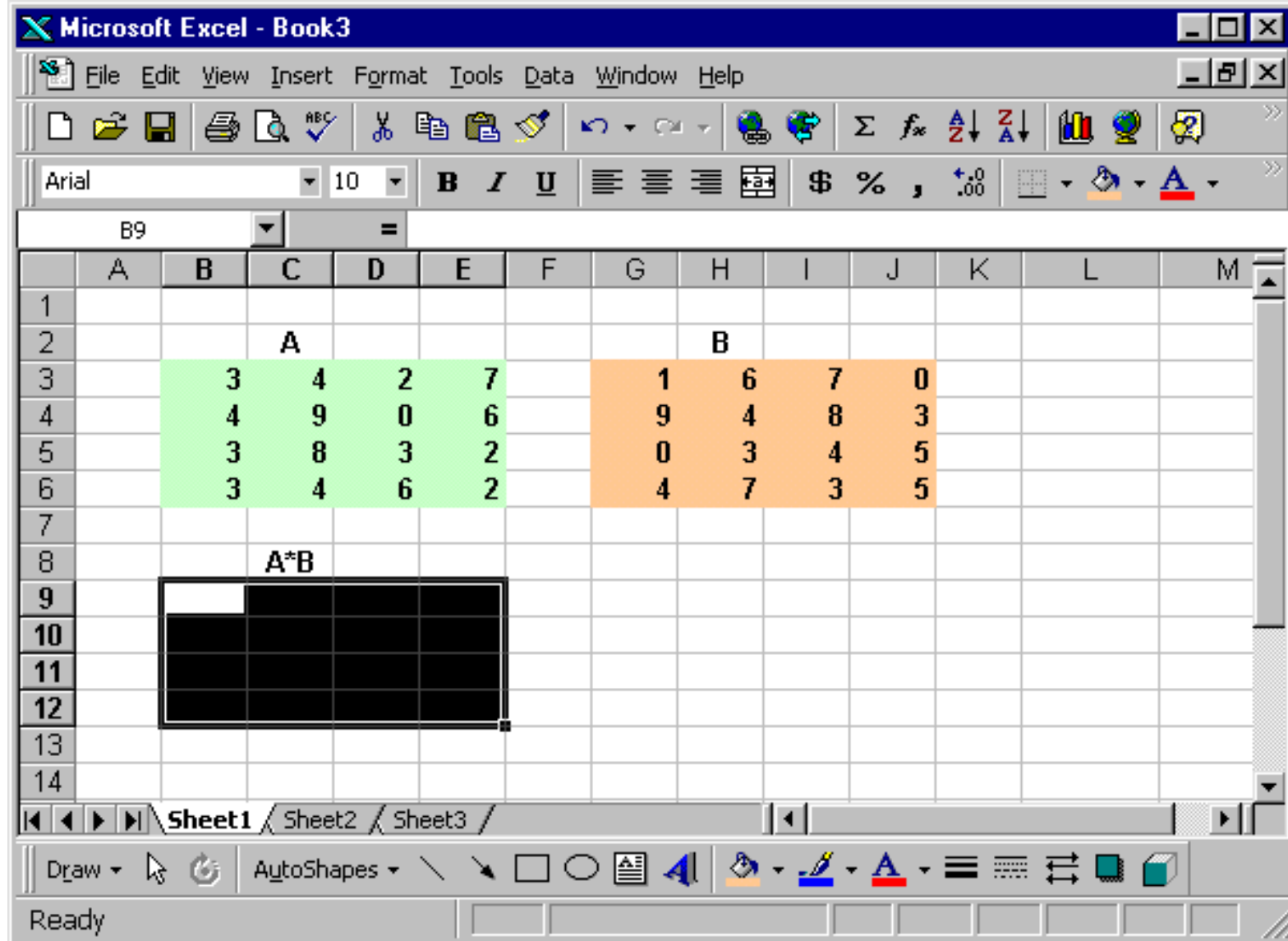
	A	B	C	D	E	F	G	H	I	J	K	L	M
1													
2			A					B					
3		3	4	2	7			1	6	7	0		
4		4	9	0	6			9	4	8	3		
5		3	8	3	2			0	3	4	5		
6		3	4	6	2			4	7	3	5		
7													
8													
9													
10													
11													
12													

Sheet1 Sheet2 Sheet3

Draw AutoShapes

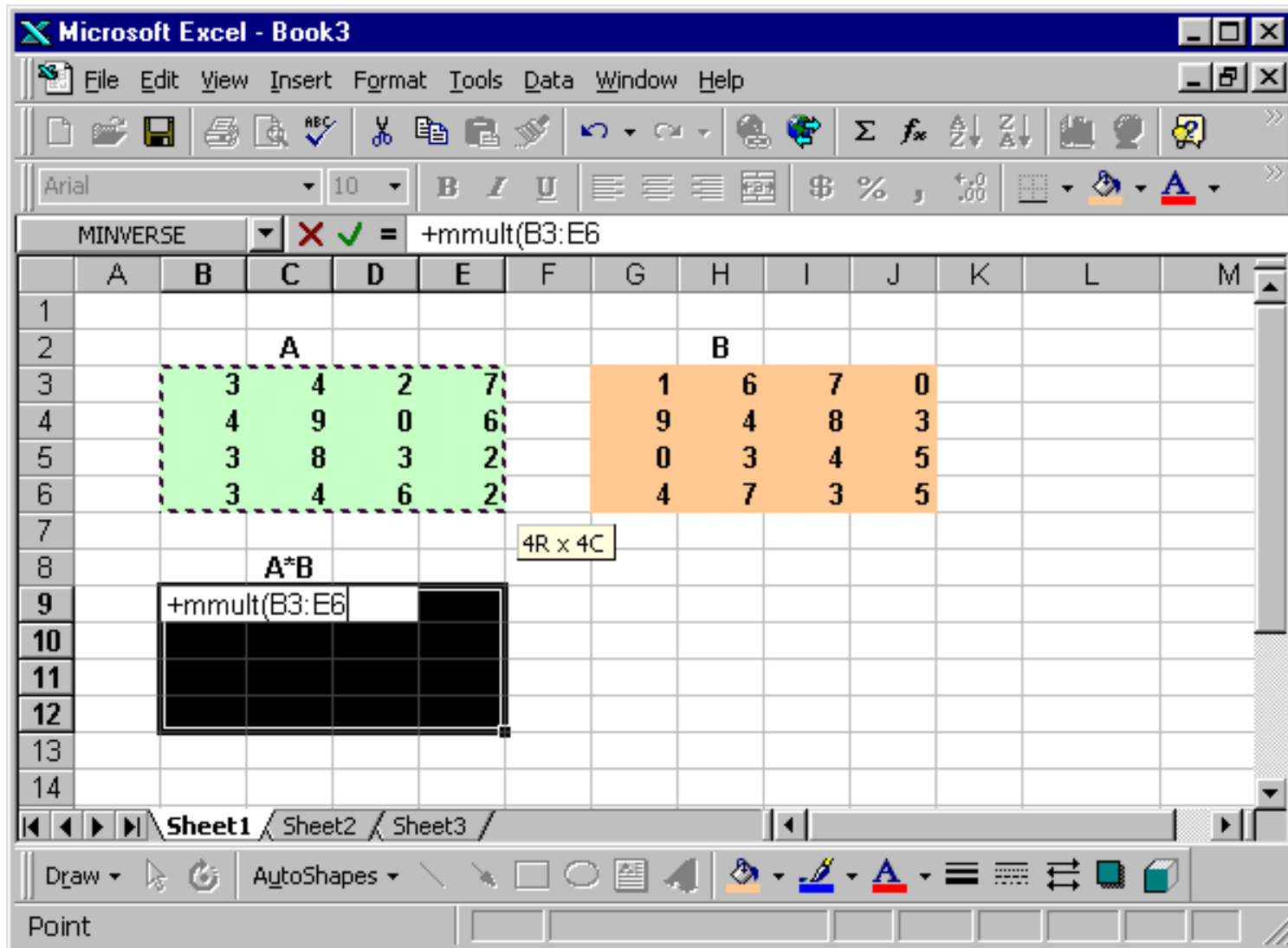
Ready

Step 2. We want to Multiply $A*B$, then with the mouse (or keyboard) “**paint**” the cells where the $A*B$ matrix will be placed. (**Note that you must know the dimension of the new matrix**). In our example the $A*B$ matrix will be $4*4$ (since A is $4*4$ and B is also $4*4$), then we “**paint**” with the mouse a **$4*4$ matrix** for the multiply output **as shown in the picture 2**.



➤ In this case our new matrix ($A*B$) will be in the cells : B9..E12.

Step 3: We can see that the cells for matrix (A*B) is selected and we started typing the command, at this point we typed: =mmult(and using the mouse or the keyboard we have painted (selected) the matrix A.



Step 4. Now, type a “comma” (,) and go to paint (select) matrix B, (After that, close parenthesis). See Picture 4.

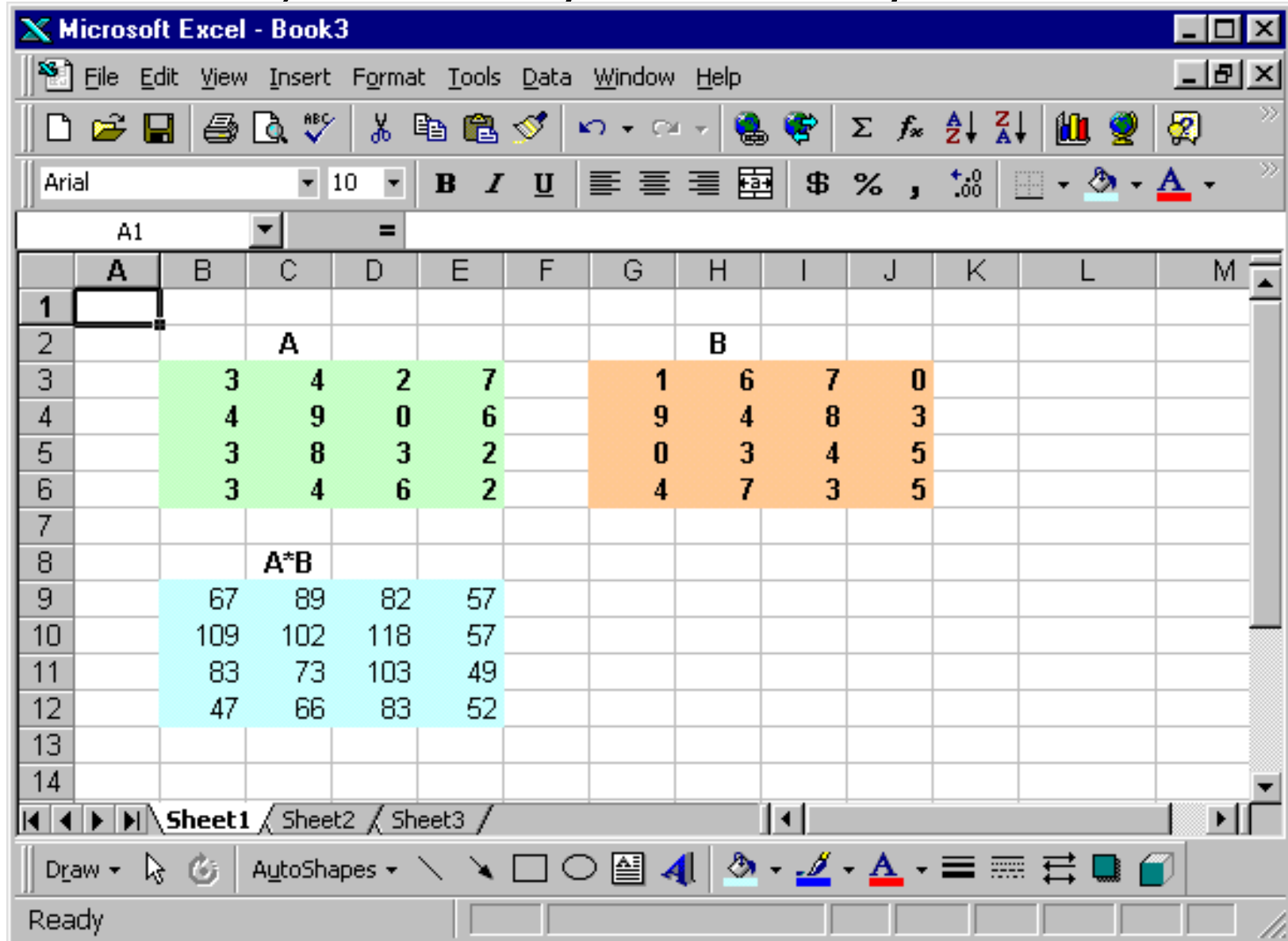
The screenshot shows the Microsoft Excel interface with the following details:

- Formula Bar:** Displays `=MINVERSE` in the dropdown and `+mmult(B3:E6,G3:J6)` in the input field.
- Worksheet Grid:**
 - Columns A-M, Rows 1-14.
 - Matrix A (green background) is located in cells B3:E6 with values:

3	4	2	7
4	9	0	6
3	8	3	2
3	4	6	2
 - Matrix B (orange background) is located in cells G3:J6 with values:

1	6	7	0
9	4	8	3
0	3	4	5
4	7	3	5
 - Matrix A*B is labeled in cell B8.
 - A formula box for `+mmult(B3:E6,G3:J6)` is shown in the grid, covering cells B9:E12.
 - A tooltip `4R x 4C` is visible near cell K7.
- Sheet Tabs:** Sheet1, Sheet2, Sheet3.
- Status Bar:** Shows "Enter" and several empty input fields.

Step 5. The last step, is the most important: Press CTRL-SHIFT-ENTER, and there you will have you're A*B Matrix.



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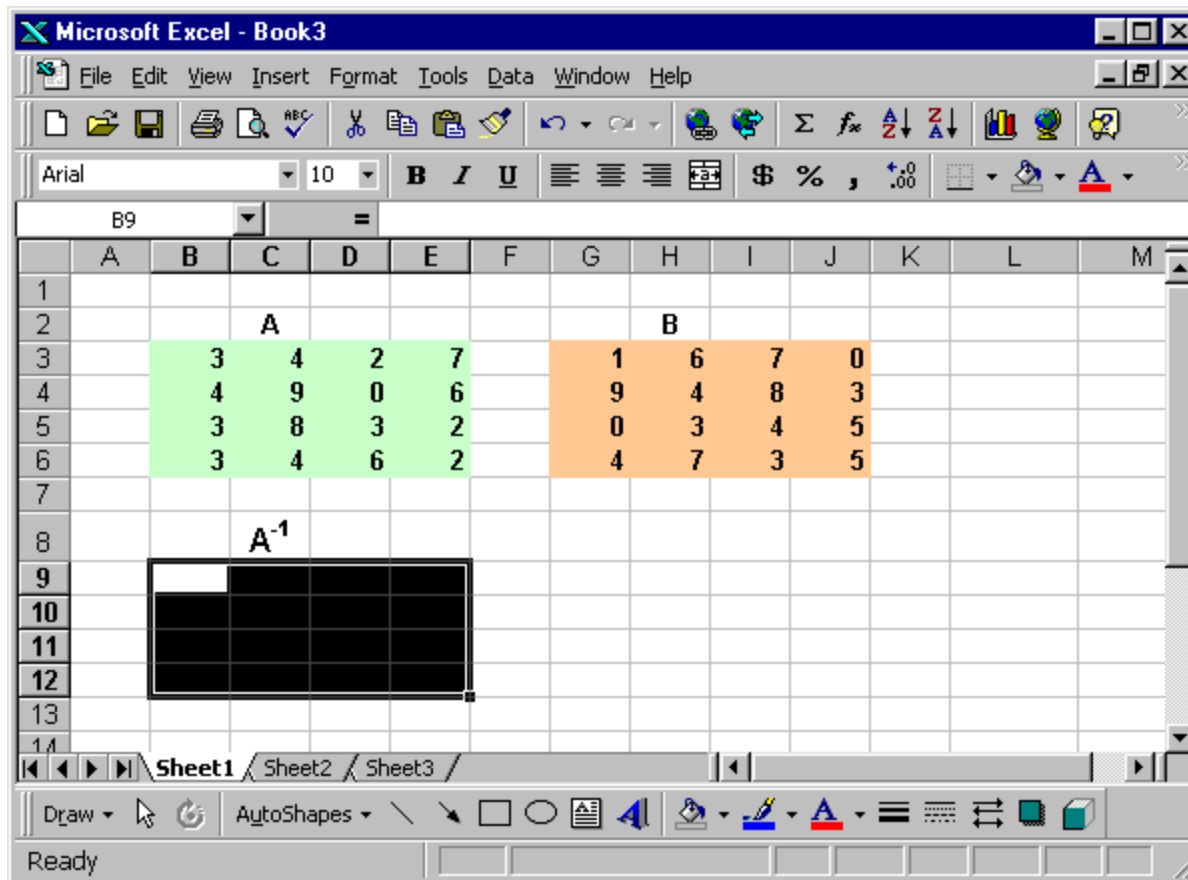
	A	B	C	D	E	F	G	H	I	J	K	L	M
1													
2			A					B					
3		3	4	2	7		1	6	7	0			
4		4	9	0	6		9	4	8	3			
5		3	8	3	2		0	3	4	5			
6		3	4	6	2		4	7	3	5			
7													
8			A*B										
9		67	89	82	57								
10		109	102	118	57								
11		83	73	103	49								
12		47	66	83	52								
13													
14													

Sheet1 / Sheet2 / Sheet3

Ready

Matrix Inversion

Step 1. Let's suppose that we want to invert matrix A, defined in picture 1., The first thing to do is to “paint” (select) the cells for the inverse output, as shown in following picture.



Step 2. Type the command to invert the matrix: `+minverse(.....)` You can use the mouse or keyboard to select the matrix.

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MINVERSE [X] [✓] [=] +minverse(B3:E6)

	A	B	C	D	E	F	G	H	I	J	K	L	M
1													
2			A					B					
3		3	4	2	7		1	6	7	0			
4		4	9	0	6		9	4	8	3			
5		3	8	3	2		0	3	4	5			
6		3	4	6	2		4	7	3	5			
7													
8			A ⁻¹										
9			+minverse(B3:E6										
10													
11													
12													
13													
14													

4R x 4C

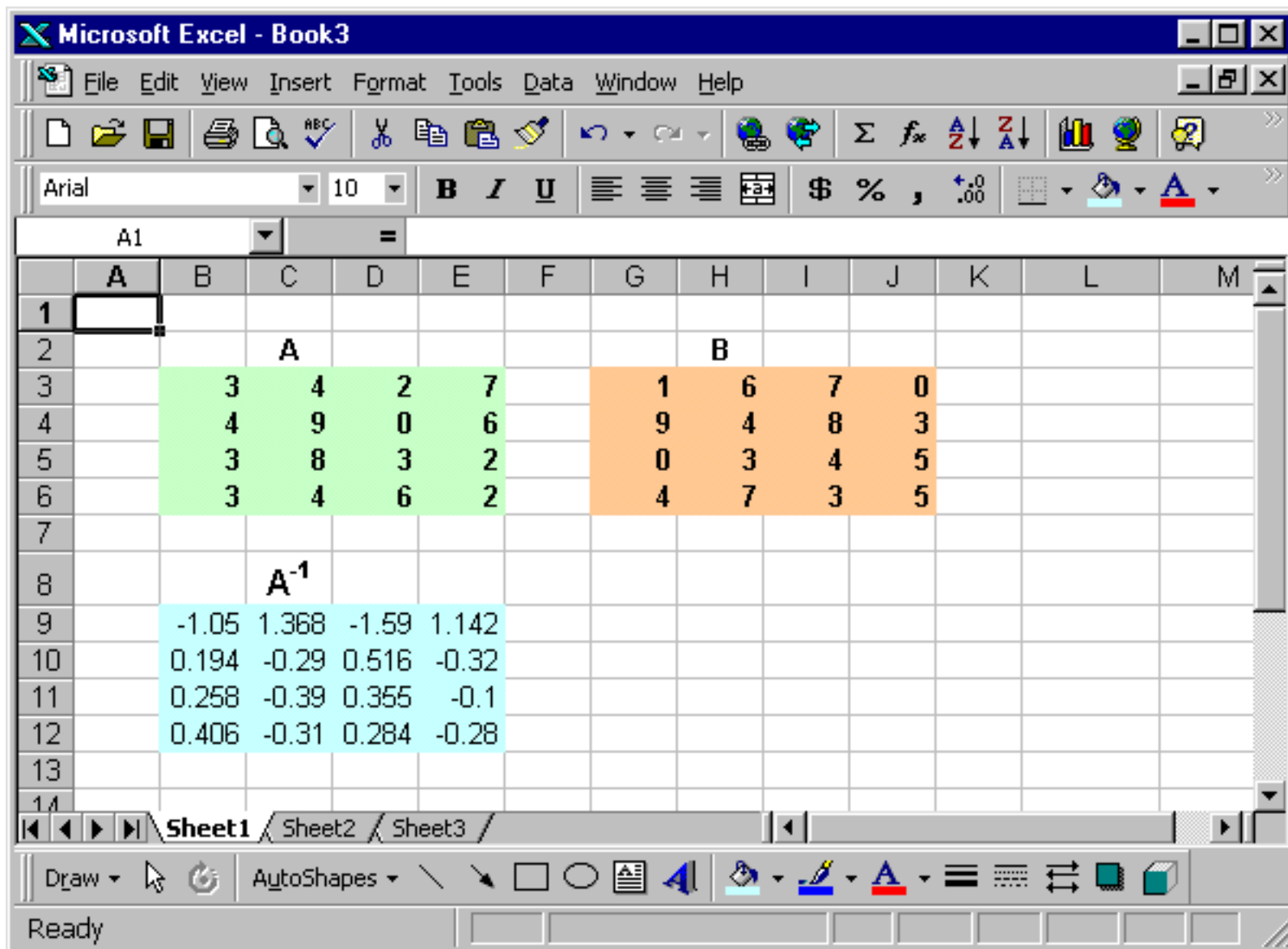
Sheet1 Sheet2 Sheet3

Draw AutoShapes

Point

Step 3. Just press **CTRL-SHIFT-ENTER** and you will get you're A⁻¹

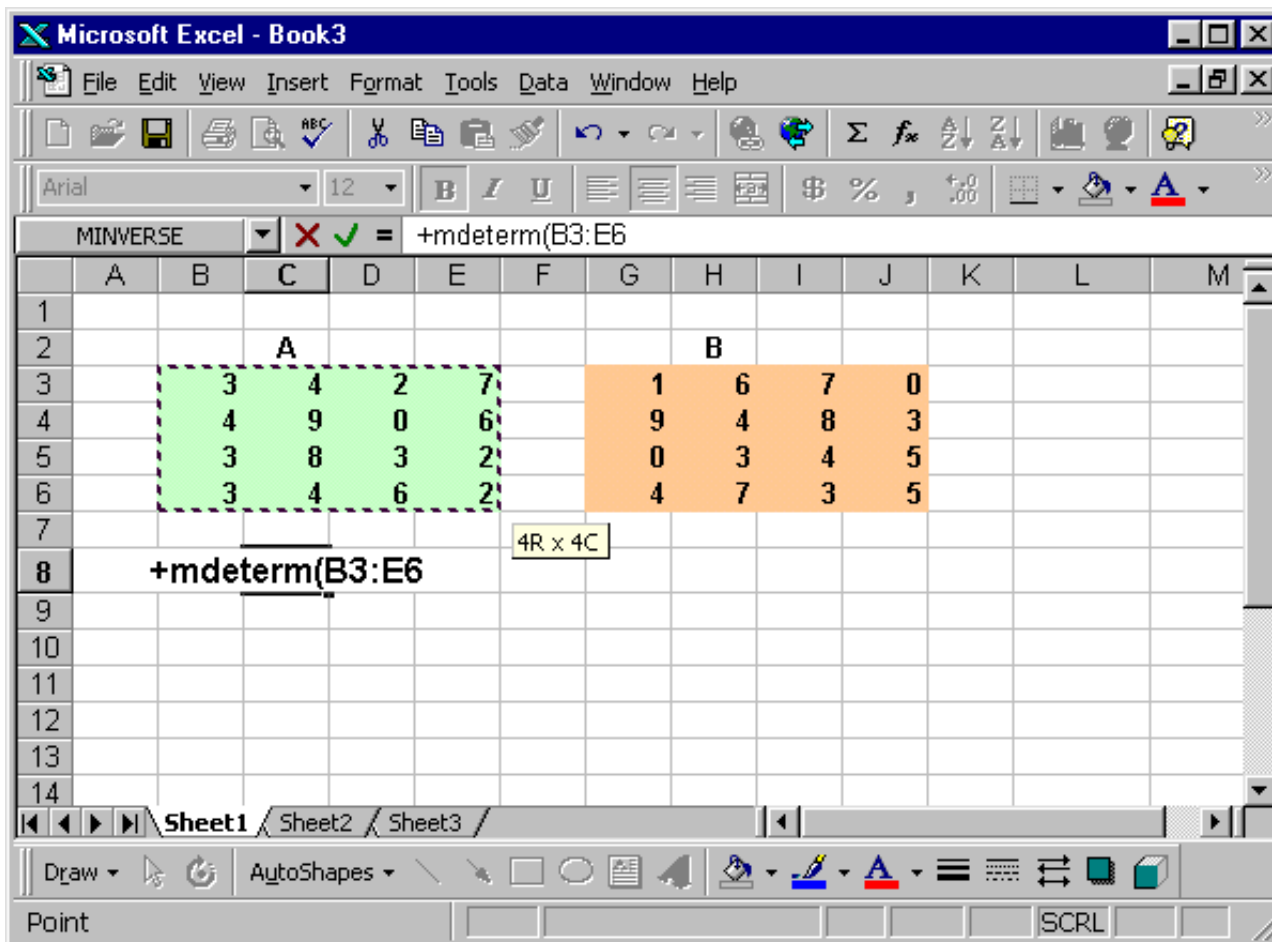
Note: It's not necessary to close the parenthesis.



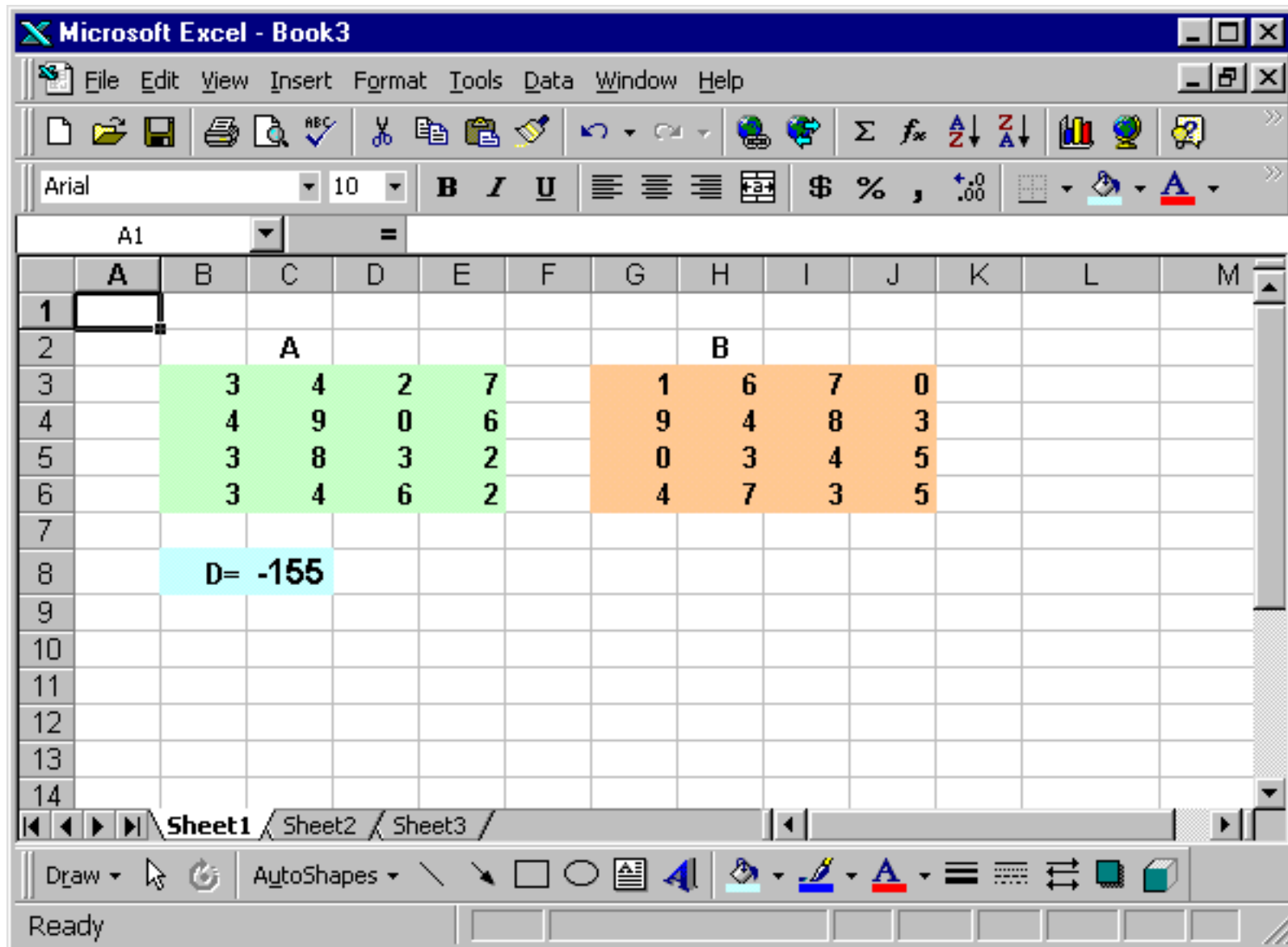
Determinant of a Matrix

Step 1. To get the determinant of a matrix simply locate the cursor in any cell, (the determinant is only one value, then it uses one cell).

Step 2. Type the command and select the matrix.



Note: it's not necessary to close the parenthesis.



Summation of matrices:

1- select the cells to print the summation output (as shown in red cells)

2- insert the +B1:D3+G1:I3 Press **CTRL-SHIFT-ENTER**

