MATRIX COMPUTATIONS IN MICROSOFT EXCEL

A matrix is a rectangular array of numbers. Microsoft Excel handles matrices through what it calls "array formulas." These are functions that operate on a range of values. Array formulas are created by typing the formula into the relevant cell(s), and then pressing CTRL-SHIFT-ENTER. The formula is then displayed in {brackets} to indicate that it is an array formula. (You can't type these brackets in directly; you have to go the CTRL-SHIFT-ENTER route.)

So let's see how Microsoft Excel will handle some basic matrix arithmetic procedures that are useful in regression analysis.

Multiplying two matrices:

Let's suppose we want to multiply two matrices:

$$\begin{bmatrix} 1 & 3 & 6 \\ 4 & 2 & 3 \end{bmatrix} \cdot \begin{bmatrix} 5 & 1 \\ -3 & 1 \\ 2 & 4 \end{bmatrix}$$

Let's put the six numbers in the first matrix in cells A1:C2 of the spreadsheet, and the four numbers in the second matrix in cells E1:F3 of the spreadsheet, thus:

	A	B	C	D	E	F
1	1	3	6		5	1
2	4	2	3		-3	1
3					2	4

Since the resulting matrix will be two-by-two, select a two-by-two range of empty cells – say cells A4:B5. Type the cell formula

=MMULT(A1:C2, E1:F3)

and hit CTRL-SHIFT-ENTER. The resulting matrix is

$$\begin{bmatrix} 8 & 28 \\ 20 & 18 \end{bmatrix}$$

These values will appear in the indicated cells (A4:B5).

Inverting a matrix:

Remember that only square matrices can be inverted. Let's find the inverse of the two-by-two matrix we just computed. The inverse of a two-by-two matrix will be two-by-two. So select a two-by-two block of cells on the spreadsheet – let's say, A7:B8. Type the formula

=MINVERSE(A4:B5)

and hit CTRL-SHIFT-ENTER. The resulting inverted matrix is

$$\begin{bmatrix} -0.04327 & 0.067308 \\ 0.048077 & -0.01923 \end{bmatrix}$$

Finding the determinant of a matrix:

Remember that only square matrices have determinants. The determinant is a single number. To find the determinant of the matrix we just put in cells A7:B8, select an empty cell and type

=MDETERM(A7:B8)

and simply hit ENTER (no CTRL-SHIFT is needed, since the result is not an array). We'll find that the determinant of this matrix is –0.0024.

Transposing a matrix:

Let's transpose the two-by-three matrix we put in cells A1:C2. Since the result will be three-by-two, we need to select a three-by-two block of cells. Then type

=TRANSPOSE(A1:C2)

and hit CTRL-SHIFT-ENTER.