

Mathematica for Linear Algebra

To start Mathematica, double click the program icon. This will open a window entitled Untitled-1. You may now type in an instruction such as:

15 !

then hit **SHIFT RETURN** to evaluate it.

Usually, when you want to print you will need just certain calculations rather than your whole Mathematica session. For this, use Print Selection under the file menu. Select the selection you want to print by clicking on the bracket to the right of it. (Use control click to select more than one bracket.)

Notes on Notation

CAPITALS MATTER in Mathematica. Typically, built in commands and names (such as Integrate, PlotStyle, Pi) start with the first letter of EachWord Capitalized. You can name your variables using either capitals or lower case, but COST, Cost, and cost would all be different variables.

Mathematica automatically creates something of an outline structure for your session. This is indicated by the brackets on the right. You can select a cell by clicking on it. If it is a cell that can be evaluated (note the triangle), you can then evaluate it by Shift Return. You could also edit it, delete it, copy or move it (use the pull-down edit menu), or minimize or restore it (click twice).

Symbols: * or space for multiplication of numbers,
/ for division of numbers
^ for exponentiation
() to indicate order of evaluation
[] used with functions and commands
{ } to indicate lists
% to indicate the result of the last calculation performed
%% indicates result of the second to last calculation performed,
and etc.

Linear Algebra

Vectors are entered in Mathematica as lists, using curly brackets {}. For example, the vector (1,0,0) would be entered as {1,0,0}.

Matrices are entered as lists of lists, that is as a list of rows. For example, the matrix $\begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix}$ would be entered as $\{\{1,1\},\{3,4\}\}$.

Use the command `MatrixForm[A]` to display the matrix A on the screen in usual rows and columns instead of as lists.

Use `A.b` to multiply a matrix A times a vector b.

Example:

```
In[6]:= b = {-1, 2}
Out[6]= {-1, 2}

In[3]:= A = {{1, 2}, {3, 4}}
Out[3]= {{1, 2}, {3, 4}}
```

In[7]:= **A.b**

```
Out[7]= {3, 5}
```

In[4]:= **MatrixForm[A]**

```
Out[4]/MatrixForm=
  ( 1  2 )
  ( 3  4 )
```

The command `RowReduce[]` gives the reduced echelon form of a matrix.

Example:

```
In[9]:= B = {{1, 2, 3}, {4, 5, 6}}
Out[9]= {{1, 2, 3}, {4, 5, 6}}
```

In[10]:= **RowReduce[B]**

```
Out[10]= {{1, 0, -1}, {0, 1, 2}}
```

In[11]:= **MatrixForm[%]**

```
Out[11]/MatrixForm=
  ( 1  0  -1 )
  ( 0  1   2 )
```

To learn more about Linear Algebra commands, under the Help menu, select Documentation Center, then Mathematics and Algorithms, then Matrices and Linear Algebra.