

A warm-up with Mathematica

You can download Mathematica with OSU's license to your personal computer from here: <https://is.oregonstate.edu/service/software/mathematica>. Any computer in the lab room Kidder Hall 108 J also has Mathematica installed. After installing the software, try the following:

1. Type $35/6$, then Shift+Enter.
2. Type $N[35/6]$ (note: square brackets), then Shift+Enter.
3. Type $Sqrt[2]$ (note: capitalized S). Shift+Enter.
4. Type $N[%]$. Shift+Enter.
5. Type $Sin[Pi]$ (note: capitalize S and P). Shift Enter.
6. Type 34^100 ; (note: semicolon). Shift Enter.
7. Type 34^100 (note: without semicolon). Shift Enter.

At this point, you may have noticed that the function N is to evaluate an expression in decimal-point form. Each function's name is capitalized and used with square brackets (not parenthesis as we normally do on paper). The semicolon is to hold the output. One uses it when output is too long or not of interest. Next, try the following:

1. $Sum[k, \{k,0,5\}]$. Shift+Enter.
2. $Sum[k, \{k,0,n\}]$. Shift+Enter.
3. $Sum[k^2, \{k,0,5\}]$. Shift+Enter.
4. $Expand[(k+1)^4]$. Shift Enter.

Suppose you want to learn how to factor an expression, say $k^2 - 3k + 2$. Press F1 (or click on Help on the Menu). Type the word "Factor". It will show you the syntax of the function Factor and several examples. Next, try the following:

1. $Exp[1]$. Shift+Enter.
2. $Log[2]$. Shift+Enter.
3. $f[x_] := Sin[x] + Cos[x]$ (note: the dash after x). Shift+Enter.
4. $f[Pi] + f[Pi/4]$. Shift+Enter.
5. $Clear[f]$. Shift+Enter.
6. $f[Pi] + f[Pi/4]$. Shift+Enter.

The natural logarithm function is named Log in Mathematica (not ln). Exp is the exponential function. The third command is to define a function. The dash is required in order to tell Mathematica that we are defining the function f . The function Clear is to remove a defined variable from the memory. Next, try the following:

1. $Plot[Sin[x], \{x,0,2*Pi\}]$. Shift+Enter.
2. $Plot[Sin[x], \{x,0,2*Pi\}, Filling \rightarrow Axis]$. Shift+Enter. Note: the arrow is typed as \rightarrow .

3. `f[x_] := Sin[x]+Cos[x]. Shift+Enter.`
4. `Plot[f[x], {x,0,2*Pi}, Filling→Axis]. Shift+Enter.` Note: the dash after x is no longer used after the definition of f .
5. `Plot[{Sin[x], Cos[x]}, {x,0,2*Pi}, PlotLegends→"Expression"]. Shift+Enter.`
6. `Plot[{Sin[x], Cos[x]}, {x,0,2*Pi}, PlotLegends→"Expression", Filling→{1→{2}}]. Shift+Enter.`