

Getting Started: Typesetting Math

Bernd Beber
bhb2102@columbia.edu

September 10, 2008

There are at least three different types of programs that will allow you to typeset math: (1) the Equation Editor included in packages such as AppleWorks and Microsoft Office; (2) an editor such as Scientific Word or Scientific Workplace, which creates \LaTeX (pronounced latek) documents without the user having to learn the \LaTeX language itself; (3) a \LaTeX typesetting engine and editor.

1. The Equation Editor probably has the lowest start-up costs, but it is slow and inflexible, and the typeset result is considered by many to be inferior to a document compiled from \LaTeX code. To use the equation editor, simply open your word processor (e.g. Word, Works, WordPad), and click on Insert \Rightarrow Object \Rightarrow Equation. Usage is intuitive: Point, click, and type to create mathematical notation.

The Equation Editor comes with products such as MS Office. If you can't insert an equation object, you may have to change the installation of your word processor. (For example, if you're using MS Office on a PC running Windows, go to Start \Rightarrow Settings \Rightarrow Control Panel \Rightarrow Software; highlight MS Office and click Change Installation; then add the Equation Editor. You may need your installation CD for this.)

A more sophisticated version of the Equation Editor is called MathType (both programs were developed by the same company, Design Science). A free 30-day evaluation version is available at <http://www.dessci.com/en/products/mathtype/trial.asp>. If you don't purchase a license during the trial period, MathType will essentially turn into Equation Editor, so this is a useful download if you don't have the Equation Editor already installed and can't find your MS Office installation disk.

2. Some programs, such as Scientific Word or Scientific Workplace, let you create \LaTeX documents without you having to learn the \LaTeX language. The main difference between Scientific Word and Scientific Workplace (both by MacKichan Software) is that the latter performs computer algebra in addition to typesetting operations, i.e. it has some of the capability that programs such as Mathematica, MathCad, and Matlab

offer. In Scientific Word and Workplace, you can use toolbars and menus to easily create mathematical notation, and the default is to not show the actual \LaTeX code. Disadvantage: These programs are proprietary, and the list prices for a student license are \$180 (Scientific Word) and \$260 (Scientific Workplace). A non-proprietary program that falls into this category is LyX, and it's available at <http://www.lyx.org>.

3. The third (and in my view preferred) option is to write directly in \LaTeX . \LaTeX is a mark-up language like HTML, and what that means is that you type up what you want to have displayed as well as how you want to have it displayed in your typeset document. This is different from programs such as MS Word, where formatting is visual and you basically get what you see.

You will need two types of programs to put together a \LaTeX document: a typesetting engine (also called a distribution or compiler), which transforms your \LaTeX code into a typeset document; and an editor (also called front end or integrated development environment, IDE) that you can use to write code and feed it to the engine. (Some editors come with a typesetting engine included, but most don't.) In principle you can use any text editor, but it'll make things easier for you if you use an editor that has been written with TeX in mind. Both types of program, distributions and editors, are available for free.

If you're a Windows user, proTeXt includes a distribution (MiKTeX), a couple editors (WinEdt and TeXnicCenter), and some other tools. It's a very large download, but it'll install all the programs you need.

Otherwise install the typesetting engine first. MiKTeX is a popular distribution for Windows and the basic installer is a much quicker download than the complete distribution included in proTeXt (the basic version MiKTeX will retrieve updates as necessary). A popular distribution for Mac is OzTeX.

Second, install an editor. Popular choices for Windows include TeXnicCenter, WinEdt, and WinShell. Choices for Mac include TeXShop and iTeXMac. I personally run Windows and use the basic MiKTeX distribution (installing packages as needed) together with WinShell.

So how do you write \LaTeX code? There are a number of good introductions to the language available on the web, for example [here](#) and [here](#). Once you have typed something you want to compile, you should be able to easily create PDF files in any of the text editors listed above. (The necessary command may be in a pull-down menu called 'Typeset' or 'Execute' or 'Compile'.)

Bonus explanation: How can you create graphs? Some editors let you create graphs (e.g. Scientific Workplace) and it is possible to do certain kinds of visualization in \LaTeX , but

I prefer to generate graphs in R, save the output as a graphics file, and import it into the L^AT_EX document. R is heavily used in statistics, and it is available for free at <http://www.r-project.org>.

To see a basic example, try typing the following code at the R prompt:

```
x <- 10:30
y <- sin(x)
plot(x, y, col="green", pch=19)
curve(sin(x), add=T)
abline(h=0, col="blue")
```