

The Very Basics of TeX

TeX is a typesetting programming language. The most important thing to know if you want to write your problem sets in TeX is that it runs in two modes: normal mode and math mode. In normal mode, only text is handled. You can alter the text (for example, making it bold-face or italic) but generally you can't use any fancy characters or typesetting in normal mode. A new paragraph is started when you leave a blank line in the TeX file.

Some normal-mode commands to know:

- "`\bf TEXT`" puts TEXT in bold face.
- "`\it TEXT`" or "`\em TEXT`" puts TEXT in italics.
- "`\smallskip`", "`\medskip`", and "`\bigskip`" insert various small amounts of whitespace, in between paragraphs for example.
- Put "`\begin{enumerate}`" if you want to give a numbered list. Start each element in the list with "`\item`", and when the list is finished, put "`\end{enumerate}`"
- "`\begin{itemize}`" with "`\item`" will do the same thing without numbering the items.

In math mode, letters are written in italics (they are assumed to be variables or functions, not words), and more advanced typesetting is allowed. In order to switch back and forth between math mode and normal mode, you use the \$ character. That is, if you add "`x^2`" in the middle of a bunch of normal mode text, the first '\$' changes the mode to math mode, the '`x^2`' is interpreted and typeset correctly, and then the second '\$' changes the mode back to normal mode.

Some math-mode commands to know:

- `x^a` will put "a" as an exponent of x.
- `x^{abc}` will put "abc" as an exponent of x. If you put `x^abc` you will get output that looks wrong.
- `x_a` will put "a" as a subscript of x. Similarly, `x_{abc}` should be used for longer subscripts.
- `x^{y_a}` and `x^{y_b}` work, et cetera.
- `α` will produce an alpha character. Give the name of a greek letter after a '\' (the command character) to get that greek letter.
- `\dots` will produce the '...' such as in "`1 + 2 + ... + n`"
- '{' and '}' are special characters. To get '{' or '}' to show up, use `\{'` and `\}'`.

There are many other commands you can use in math mode. For a more extensive LaTeX reference online, try [The Not So Short Introduction to LaTeX 2e](#), especially the [List of Mathematical Symbols](#).

One final word about math mode: When you use the single '\$' to go into math mode and then back out, this inserts your mathematical type in the middle of the paragraph. If what you want is to give an equation or mathematical phrase on its own, go into math mode with a double '\$\$' and back out the same way. This will put that incident of math mode on its own line, centered. Some commands will come out looking different if you put them on their own line. For instance, if you use $\sum_{i=0}^n i$, the limits on the sum will be to the right of the sum symbol. However, if you use
$$\sum_{i=0}^n i$$
, the limits will be on the top and the bottom.

Debugging

When you have finished writing your .tex file, run "latex ps1.tex" from the server (or whatever) prompt. If you had no bugs in your TeX code it'll go right through and give you a server prompt again. However, you will probably have some errors. Most errors fit into one of these few categories:

1. You forgot to close something you opened. You forgot to put enough close parentheses or curly braces, or you left off the closing \$ to go out of math mode. You may also have forgotten to put "\end{enumerate}" after your numbered list was finished. Remember that if you use \$\$ to put a math mode block on its own line, you must close with a \$\$\$. If you close with a single \$, it will cause an error.
2. Similar to the above, you forgot to open something you closed.
3. You used a non-existent command.
4. You used a command in normal mode that is only supposed to be used in math mode. Sometimes this can look like a #3-type problem.

Feel free to ask me questions about TeX over email; I'll help you if I can. I'm not particularly good at things like importing graphics or matrix layouts, but I get by pretty well generally.

.Dvi? What's that?

When your "latex file.tex" command goes through, it creates a file called "file.dvi". This can now be printed by typing "dvips file.dvi" - on server this will print to the default printer. DVI files can also be used to produce postscript files. To make file.dvi into file.ps, run "dvips file.dvi -o file.ps"

If you want to check over your file to make sure it looks right (without printing it), you have two options. First of all, you can use the above instructions to create a postscript file, and use ghostview ("gv file.ps &") to view it. Or, more simply, you can just run "xdvi file.dvi &" to view your .dvi file without changing it to postscript.

One Final Hint

If you have a TeX bug that you can't figure out, if worse comes to worse, just delete the problematic section and put a bunch of "`\bigskip`"s in its place. Then, once you print out your file, just write the solution in.