

# Getting started with L<sup>A</sup>T<sub>E</sub>X on XP

A very brief beginners guide

Version 1.4: The current version is linked to from [www.maths.leeds.ac.uk/school/students](http://www.maths.leeds.ac.uk/school/students)

## 1 Introduction

This is a very simple document to help get you started with L<sup>A</sup>T<sub>E</sub>X. L<sup>A</sup>T<sub>E</sub>X is a sort of “typesetting” language which allows the user to type complicated mathematics – a tedious (though not difficult) task using WORD for example. It is freeware, so you can get copies for use at home *etc.*<sup>1</sup>

**Warning:** It is possible to spend huge amounts of time getting the layout exactly as you want it. But remember that content is more important. If you run into difficulty, then ask.

To produce a document, there are essentially three stages.

1. In any (ascii) text editor, you type the words, including special commmands that tell the program how you want it to appear. So, for example, you type

`$$\alpha$`

to produce the Greek letter  $\alpha$ . The dollar signs mean that L<sup>A</sup>T<sub>E</sub>X will interpret what comes between them as mathematics. At this stage it is not WYSIWYG (What You See Is What You Get), but easily transportable.

2. The document is then processed by the `latex` command, after which you can **preview** the output. You can preview on screen (almost) exactly what can be printed. It is now WYSIWYG.
3. After you are happy that no further edits are necessary, you can print the final version.

## 2 Starting L<sup>A</sup>T<sub>E</sub>X on the ISS network

You can modify the following suggestions when you know what you are doing. To begin use the **Start** button (lower left corner of the screen):

- **Programs**→**miscellaneous**→**latex** This will launch a directory window.
- Double-click on the “WinShell” button and the “LaTeX2e help file” button. This will give a Winshell window, and another html **help window**. I suggest that you now close all windows except the Winshell window (and the help window).
- Use the **File** button to **Open** the file: `l:\win32apps\TEX50\local\latex\sample2e.tex` Make it your file by using **File**→**Save As** and then save it in your own workspace - say as `m:\latex\project.tex`.
- Try processing your L<sup>A</sup>T<sub>E</sub>X file by clicking on the **LaTeX** button. You may see processing information in the lower window, but in general there is no need to look at this unless it stops with a question mark (including a line number), which usually indicates some type of typesetting error. When this occurs, it is best to type a **q** (carry on *quietly*; do your best) to let it do the best it can – then try to fix the error.

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<sup>1</sup>To download your own copy, go to [www.miktex.org/setup.html](http://www.miktex.org/setup.html)

- In order to preview your work, click on the DVI button. This will launch a **preview window** which can be resized or minimized. Use the  $\ominus$  button to shrink the output to fit, and the arrows to move from page to page.
- You can now modify your project, save the file, and then re-LaTeX it to see how it changes. You may need to click on the \* button in the **preview window** to update this but it will usually happen automatically.
- When you are ready to print, click on the DVI→PS button, then the “ghost-with-goggles” button. This will launch a new window (click OK when prompted) – GSview – from which you can **File** → **Print**.

Note that we don't see the output in its final form when it is being typed in the text editor. But in this case a little patience is amply rewarded, for a large number of symbols not available in most word processing programs become available. In addition, the typesetting is done with more precision, and the input files are easily sent between different operating systems by electronic mail or on a CD *etc.*

### 3 Inputting maths

The html **help window** allows you to browse through various commands. In addition there is an on-line manual on the web page:

[www.maths.leeds.ac.uk/school/students/docs/latex-short.pdf](http://www.maths.leeds.ac.uk/school/students/docs/latex-short.pdf)

This will cost you alot to print, though you may want to do so. Using the table of contents, and index should help you to find what you are looking for.

In Winshell, to the left of the question mark button on the menu bar, there are various symbol buttons which lead to many “point & click’ routes to inputting text and symbols – quite useful shortcuts for mathematics (but don't forget the \$ !).

The remainder of this document explains how to import figures and pictures into L<sup>A</sup>T<sub>E</sub>X from other packages, and concludes with a few useful reference tables of L<sup>A</sup>T<sub>E</sub>X commands.

### 4 Importing Figures

It is easiest to include PostScript figures in L<sup>A</sup>T<sub>E</sub>X. [In general, so long as you can get your figure in Encapsulated PostScript, it does not matter where it came from.] Figures can be resized and repositioned in an orderly fashion. The basic procedure is to draw your picture (for example, in MAPLE or R) and then “export to EPS” (MAPLE) or “print to file” the figure giving a file name which is in your m:\latex directory. We will suppose that the file is called: m:\latex\figure1.eps.<sup>2</sup>

To include this figure in your L<sup>A</sup>T<sub>E</sub>X document type the following commands at the point where you would like the figure to appear.

```
\begin{figure}[htbp]
\centerline{\includegraphics[width=12cm]{figure1.eps}}
\caption{\label{fig1}This is a title for my picture}
\end{figure}
```

Figures are a type of “float” – because of their size they may not come on the page exactly wher they come in the text. Because of this we have specified our order of preference in the statement [htbp] which gives priority: **here bottom top page**. Note that we can resize the figure with the command “width=12cm”. Note also the \label{fig1} entry in the caption command. This means that we can refer to this as Figure \ref{fig1} in the text and L<sup>A</sup>T<sub>E</sub>X will keep track of all the numbers for you.

Note that tables (like figures) can also “float” to a position where they may fit!

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<sup>2</sup>To save a figure in R use the command: `dev.copy2eps(file="latex/figure1.eps")`

## 4.1 Drawing figures

L<sup>A</sup>T<sub>E</sub>X has a number of packages which can draw very simple pictures, but it can get tedious to write these commands, and editing is subsequently tricky. If you want to draw some sort of sketch, a good way is to use the package CORELDRAW which can be found in *Programs*→*Graphics*→*CorelDraw*. Once you have drawn your figure you should save it (so that you can re-edit it at a future log-in) and then *File* → *Export* to **Encapsulated Postscript** so that L<sup>A</sup>T<sub>E</sub>X can then read it in. Ensure that you save the file to your working LaTeX directory, perhaps to a name that is memorable. It is suggested that you **untick** the box: “include [image] header”. Finally click on OK.

## 5 Printing

Printing does not (always) work from the DVIwin previewer.

To print the file you should use the **File**→**Print** option from the GSview previewer (see above). You can either print directly, or print to a file in order to create a PostScript file called (say) project.eps in your directory. This file can be printed now, later, or put on a disk to print on another PostScript printer.

## 6 Troubleshooting

As mentioned above, L<sup>A</sup>T<sub>E</sub>X may stop processing the file with a ?. It may be asking for a file. If you do not have one to supply, then typing **x** will terminate the job. In most other instances, it is worth typing a **q** in which case L<sup>A</sup>T<sub>E</sub>X will do the best it can. Using the preview window together with the line number quoted should help you to find the problem. Common mistakes include a missing { or }, or a missing \$.

If L<sup>A</sup>T<sub>E</sub>X is missing some fonts, these are generated on-line – you may see a grey window pop up with lots of bracketed numbers on it. This is no cause for alarm; just be patient, and when it is complete you can “dismiss” the grey window.

## 7 Finally, a request!

This is a beginner’s guide which is only intended to get you started. It is not intended to be a manual for L<sup>A</sup>T<sub>E</sub>X. If you have any comments to make (for examples suggestions for improvement), please pass them on to Charles Taylor (School of Mathematics, 9.22b): [charles@maths.leeds.ac.uk](mailto:charles@maths.leeds.ac.uk)

## 8 Some Mathematical Symbols

See Tables 2 and 3 for Greek symbols. Other (useful) examples follow:

Table 1: Font sizes

<code>\tiny</code>	tiny font	<code>\Large</code>	larger font
<code>\scriptsize</code>	very small font	<code>\LARGE</code>	very large font
<code>\footnotesize</code>	quite small font	<code>\huge</code>	huge
<code>\small</code>	small font	<code>\Huge</code>	largest
<code>\normalsize</code>	normal font		
<code>\large</code>	large font		

Table 2: Lowercase Greek Letters

$\alpha$	<code>\alpha</code>	$\theta$	<code>\theta</code>	$o$	<code>o</code>	$v$	<code>\upsilon</code>
$\beta$	<code>\beta</code>	$\vartheta$	<code>\vartheta</code>	$\pi$	<code>\pi</code>	$\phi$	<code>\phi</code>
$\gamma$	<code>\gamma</code>	$\iota$	<code>\iota</code>	$\varpi$	<code>\varpi</code>	$\varphi$	<code>\varphi</code>
$\delta$	<code>\delta</code>	$\kappa$	<code>\kappa</code>	$\rho$	<code>\rho</code>	$\chi$	<code>\chi</code>
$\epsilon$	<code>\epsilon</code>	$\lambda$	<code>\lambda</code>	$\varrho$	<code>\varrho</code>	$\psi$	<code>\psi</code>
$\varepsilon$	<code>\varepsilon</code>	$\mu$	<code>\mu</code>	$\sigma$	<code>\sigma</code>	$\omega$	<code>\omega</code>
$\zeta$	<code>\zeta</code>	$\nu$	<code>\nu</code>	$\varsigma$	<code>\varsigma</code>		
$\eta$	<code>\eta</code>	$\xi$	<code>\xi</code>	$\tau$	<code>\tau</code>		

Table 3: Uppercase Greek Letters

$\Gamma$	<code>\Gamma</code>	$\Lambda$	<code>\Lambda</code>	$\Sigma$	<code>\Sigma</code>	$\Psi$	<code>\Psi</code>
$\Delta$	<code>\Delta</code>	$\Xi$	<code>\Xi</code>	$\Upsilon$	<code>\Upsilon</code>	$\Omega$	<code>\Omega</code>
$\Theta$	<code>\Theta</code>	$\Pi$	<code>\Pi</code>	$\Phi$	<code>\Phi</code>		

Table 4: BIG Operators

$\sum$	<code>\sum</code>	$\bigcup$	<code>\bigcup</code>	$\bigvee$	<code>\bigvee</code>	$\bigoplus$	<code>\bigoplus</code>
$\prod$	<code>\prod</code>	$\bigcap$	<code>\bigcap</code>	$\bigwedge$	<code>\bigwedge</code>	$\bigotimes$	<code>\bigotimes</code>
$\coprod$	<code>\coprod</code>	$\bigsqcup$	<code>\bigsqcup</code>			$\bigodot$	<code>\bigodot</code>
$\int$	<code>\int</code>	$\oint$	<code>\oint</code>			$\biguplus$	<code>\biguplus</code>

Table 5: Math fonts

<i>Command</i>	<i>Example</i>	<i>Output</i>
<code>\mathcal{...}</code>	<code>\$\$\mathcal{B}=c\$</code>	$\mathcal{B} = c$
<code>\mathrm{...}</code>	<code>\$\$\mathrm{K}_2\$</code>	$K_2$
<code>\mathbf{...}</code>	<code>\$\$\sum x=\mathbf{v}\$</code>	$\sum x = \mathbf{v}$
<code>\mathsf{...}</code>	<code>\$\$\mathsf{G}\times\mathsf{R}\$</code>	$G \times R$
<code>\mathtt{...}</code>	<code>\$\$\mathtt{L}(b,c)\$</code>	$L(b, c)$
<code>\mathnormal{...}</code>	<code>\$\$\mathnormal{R_{19}}\neq R_{19}\$</code>	$R_{19} \neq R_{19}$
<code>\mathit{...}</code>	<code>\$\$\mathit{ffi}\neq ffi\$</code>	$ffi \neq ffi$

Table 6: Binary Relations

You can produce corresponding negations by adding a `\not` command as prefix to the following symbols.

$<$	<code>&lt;</code>	$>$	<code>&gt;</code>	$=$	<code>=</code>
$\leq$	<code>\leq</code> or <code>\le</code>	$\geq$	<code>\geq</code> or <code>\ge</code>	$\equiv$	<code>\equiv</code>
$\ll$	<code>\ll</code>	$\gg$	<code>\gg</code>	$\doteq$	<code>\doteq</code>
$\prec$	<code>\prec</code>	$\succ$	<code>\succ</code>	$\sim$	<code>\sim</code>
$\preceq$	<code>\preceq</code>	$\succeq$	<code>\succeq</code>	$\simeq$	<code>\simeq</code>
$\subset$	<code>\subset</code>	$\supset$	<code>\supset</code>	$\approx$	<code>\approx</code>
$\subseteq$	<code>\subseteq</code>	$\supseteq$	<code>\supseteq</code>	$\cong$	<code>\cong</code>
$\sqsubset$ <sup>a</sup>	<code>\sqsubset</code> <sup>a</sup>	$\sqsupset$ <sup>a</sup>	<code>\sqsupset</code> <sup>a</sup>	$\bowtie$	<code>\Join</code> <sup>a</sup>
$\sqsubseteq$	<code>\sqsubseteq</code>	$\sqsupseteq$	<code>\sqsupseteq</code>	$\bowtie$	<code>\bowtie</code>
$\in$	<code>\in</code>	$\ni$	<code>\ni</code> , <code>\owns</code>	$\propto$	<code>\propto</code>
$\vdash$	<code>\vdash</code>	$\dashv$	<code>\dashv</code>	$\models$	<code>\models</code>
$ $	<code>\mid</code>	$\parallel$	<code>\parallel</code>	$\perp$	<code>\perp</code>
$\smile$	<code>\smile</code>	$\frown$	<code>\frown</code>	$\asymp$	<code>\asymp</code>
$:$	<code>:</code>	$\notin$	<code>\notin</code>	$\neq$	<code>\neq</code> or <code>\ne</code>

<sup>a</sup>Use the `latexsym` package to access this symbol

Table 7: Binary Operators

$+$	<code>+</code>	$-$	<code>-</code>	$\triangleleft$	<code>\triangleleft</code>
$\pm$	<code>\pm</code>	$\mp$	<code>\mp</code>	$\triangleleft$	<code>\triangleleft</code>
$\cdot$	<code>\cdot</code>	$\div$	<code>\div</code>	$\triangleright$	<code>\triangleright</code>
$\times$	<code>\times</code>	$\setminus$	<code>\setminus</code>	$\star$	<code>\star</code>
$\cup$	<code>\cup</code>	$\cap$	<code>\cap</code>	$\ast$	<code>\ast</code>
$\sqcup$	<code>\sqcup</code>	$\sqcap$	<code>\sqcap</code>	$\circ$	<code>\circ</code>
$\vee$	<code>\vee</code> , <code>\lor</code>	$\wedge$	<code>\wedge</code> , <code>\land</code>	$\bullet$	<code>\bullet</code>
$\oplus$	<code>\oplus</code>	$\ominus$	<code>\ominus</code>	$\diamond$	<code>\diamond</code>
$\odot$	<code>\odot</code>	$\oslash$	<code>\oslash</code>	$\uplus$	<code>\uplus</code>
$\otimes$	<code>\otimes</code>	$\bigcirc$	<code>\bigcirc</code>	$\amalg$	<code>\amalg</code>
$\triangleleft$	<code>\bigtriangleup</code>	$\triangledown$	<code>\bigtriangledown</code>	$\dagger$	<code>\dagger</code>
$\triangleleft$	<code>\lhd</code> <sup>a</sup>	$\triangleright$	<code>\rhd</code> <sup>a</sup>	$\ddagger$	<code>\ddagger</code>
$\triangleleft$	<code>\unlhd</code> <sup>a</sup>	$\triangleright$	<code>\unrhd</code> <sup>a</sup>	$\wr$	<code>\wr</code>

Table 8: Arrows

$\leftarrow$	<code>\leftarrow</code> or <code>\gets</code>	$\longleftarrow$	<code>\longleftarrow</code>	$\uparrow$	<code>\uparrow</code>
$\rightarrow$	<code>\rightarrow</code> or <code>\to</code>	$\longrightarrow$	<code>\longrightarrow</code>	$\downarrow$	<code>\downarrow</code>
$\leftrightarrow$	<code>\leftrightarrow</code>	$\longleftrightarrow$	<code>\longleftrightarrow</code>	$\updownarrow$	<code>\updownarrow</code>
$\Leftarrow$	<code>\Leftarrow</code>	$\Lleftarrow$	<code>\Lleftarrow</code>	$\Uparrow$	<code>\Uparrow</code>
$\Rightarrow$	<code>\Rightarrow</code>	$\Rrightarrow$	<code>\Rrightarrow</code>	$\Downarrow$	<code>\Downarrow</code>
$\Leftrightarrow$	<code>\Leftrightarrow</code>	$\Leftrightarrow$	<code>\Leftrightarrow</code>	$\Updownarrow$	<code>\Updownarrow</code>
$\mapsto$	<code>\mapsto</code>	$\longmapsto$	<code>\longmapsto</code>	$\nearrow$	<code>\nearrow</code>
$\hookrightarrow$	<code>\hookrightarrow</code>	$\hookrightarrow$	<code>\hookrightarrow</code>	$\searrow$	<code>\searrow</code>
$\leftharpoonup$	<code>\leftharpoonup</code>	$\rightharpoonup$	<code>\rightharpoonup</code>	$\swarrow$	<code>\swarrow</code>
$\leftharpoondown$	<code>\leftharpoondown</code>	$\rightharpoondown$	<code>\rightharpoondown</code>	$\nwarrow$	<code>\nwarrow</code>
$\rightleftharpoons$	<code>\rightleftharpoons</code>	$\iff$	<code>\iff</code> (bigger spaces)	$\leadsto$	<code>\leadsto</code> <sup>a</sup>

<sup>a</sup>Use the latexsym package to access this symbol

Table 9: Delimiters

$($	<code>(</code>	$)$	<code>)</code>	$\uparrow$	<code>\uparrow</code>	$\Uparrow$	<code>\Uparrow</code>
$[$	<code>[</code> or <code>\lbrack</code>	$]$	<code>]</code> or <code>\rbrack</code>	$\downarrow$	<code>\downarrow</code>	$\Downarrow$	<code>\Downarrow</code>
$\{$	<code>\{</code> or <code>\lbrace</code>	$\}$	<code>\}</code> or <code>\rbrace</code>	$\updownarrow$	<code>\updownarrow</code>	$\Updownarrow$	<code>\Updownarrow</code>
$\langle$	<code>\langle</code>	$\rangle$	<code>\rangle</code>	$ $	<code> </code> or <code>\vert</code>	$\ $	<code>\ </code> or <code>\Vert</code>
$\lfloor$	<code>\lfloor</code>	$\rfloor$	<code>\rfloor</code>	$\lceil$	<code>\lceil</code>	$\rceil$	<code>\rceil</code>
$/$	<code>/</code>	$\backslash$	<code>\backslash</code>				