

L^AT_EX:
what the
Introductory Guides
don't tell you

MJ Rutter
mjr19@cam

Lent 2005

Bibliography

\LaTeX User's Guide and Reference Manual, 2nd ed., Lamport, Addison-Wesley, 272pp, \$40.

The \LaTeX Companion, Goossens et al., Addison-Wesley, 530pp, £28.

The Not So Short Introduction to $\text{\LaTeX} 2_{\epsilon}$, Oetiker et al., 145pp,

<http://www.tex.ac.uk/tex-archive/info/lshort/english/lshort.pdf>

(and also .ps).

Lamport is the definitive reference for core \LaTeX , whereas Goossens covers various add-on packages. Oetiker is a highly recommended introduction: its subtitle is ' $\text{\LaTeX} 2_{\epsilon}$ in 131 minutes.'

Note that this document has probably been enlarged / reduced before it reaches you. The original has pages which are A4 landscape, and this line _____ is one inch long.

Why L^AT_EX?

Like OpenOffice, and unlike Word, it is free.

Unlike Word and OpenOffice, it can typeset a difficult word in a serif font.

Its handling of accents and equations is excellent.

Its interaction with EPS is very good.

Any text editor can be used to prepare the document.

Any sane human can read the resulting source even without access to a copy of L^AT_EX.

It has a decent contents / index / bibliography system.

It is available for most platforms (most Unixes, Windows, etc).

It is not a word-processor, it is a typesetter.

Why not L^AT_EX?

It was designed in the 1970s, and looks like it.

It is not WYSIWYG.

It is not a word-processor, it is a typesetter.

L^AT_EX's history

In 1979 Donald Knuth released T_EX. Donald Knuth is a (mad?) mathematician who wanted a better typesetting environment. So he designed T_EX, a language in which to write T_EX (web), and a new way of describing scalable fonts, and a new font family (Computer Modern). A pleasantly *ab initio* approach.

The resulting T_EX was very flexible, but a little unfriendly. A sizeable set of macros, written in T_EX, were produced by Lamport to give us first L^AT_EX 2.09 (1985), then L^AT_EX 2_ε (Mittelbach et al., 1994).

(Knuth also provided a web to Pascal translator. In order to compile T_EX from the web sources, one first had to translate to Pascal. Unless one actually had a Pascal compiler, one then had to translate the Pascal to C. Fortunately there is now `web2c`.)

latex and friends

The `latex` command merely produces a `.dvi` file. This DeVice Independent file does not contain any images, nor any font descriptions. Indeed, the `latex` command cares only about the size of images, and the size of each character in a font.

Various programs exist for manipulating dvi files, most obvious `xdvi` (display to an X11 display), `dvips` (convert to PostScript or EPS) and `dvipdfm` (convert to PDF). These do have to understand how to draw images and fonts.

Once is enough

\LaTeX operates in a single pass, so forward references are impossible. In particular, a table of contents cannot be generated in a single pass.

So, apart from the dvi file, the `latex` command produces several auxiliary files as it runs, including a `.toc` file for a the contents, a `.idx` for the index, and a `.aux` for labels. These files are read on subsequent runs, so that multiple runs of the `latex` command are often required.

First run: generate `.toc` etc.

Second run: read `.toc` etc. from first run. If contents is more than a single page, all page numbers will change...

Third run: read `.toc` etc. from second run. Hope things stabilise.

Class

A $\text{\LaTeX} 2_{\epsilon}$ document begins with a reference to a particular class.

```
\documentclass[11pt]{report}
```

Options for the class precede the class specifier. Common available classes include: letter, article, report, book, foils, revtex4.

The default text size for the first four is 10pt, but 11pt or 12pt can be specified as an option.

Letter has useful features for writing letters, foils (FoilTeX) for writing talks (e.g. this one). The others are similar, but differ in the numbering of subsections, the inclusion of chapters (not present in article) and other details. Article is usually appropriate for papers, but report or book for theses.

A $\text{\LaTeX} 2.09$ document begins

```
\documentstyle...
```

There is no excuse for playing with $\text{\LaTeX} 2.09$ documents: the backwards compatibility in $\text{\LaTeX} 2_{\epsilon}$ is imperfect and getting worse, and it is over a decade since $\text{\LaTeX} 2.09$ was superceded.

Packages

There exist many, many optional packages, most of which are compatible with all classes. Packages are ‘simply’ \LaTeX commands, which define useful extra functions.

It is best to use as few as possible, as clashes do occur, and not to include multiple packages with effectively identical functionality. For instance, to use EPS figures, one will want `graphics`, `graphicx` or `epsfig`. The ‘correct’ answer is `graphicx`, and the worst answer is all three!

My thesis starts:

```
\documentclass[11pt]{report}
\usepackage{a4wide,fancyheadings,graphicx,cite,setspace}
```

which seemed to be sufficient for most things. As packages also make use of some finite resources of the underlying \TeX system, one cannot include everything. For instance, \TeX allows a maximum of 256 counters, and some packages define quite a lot.

One can experiment with packages simply by placing them in the same directory as the \LaTeX source files, or elsewhere by defining `TEXINPUTS` appropriately.

Old Packages Never Die...

...so you should help them into obscurity.

psfig	No description available Maintainer: unknown Last modified: Oct 1993
epsfig	Include EPS in \LaTeX documents Superseded by the $\LaTeX 2_{\epsilon}$ graphics package
graphics	Primary \LaTeX package for the inclusion of graphics Author: David Carlisle
graphicx	Better support for graphics Builds upon the graphics package Author: David Carlisle

Information from CTAN's package descriptions.

It would seem odd to use either of the first two above.

Preambles

The general form of a \LaTeX document is:

```
\documentclass{...}  
[preamble]  
\begin{document}  
[document text]  
\end{document}
```

Certain commands, including `\usepackage`, must only occur in the preamble. Those that cause marks to be made on the paper must occur after it. Some may occur in either part.

Large documents are best broken into several files using `\input` or `\include`.
`\include{chap2/chap2}` expects to find the file `chap2/chap2.tex`.

Arguments and Whitespace

Compulsory arguments to LaTeX macros are enclosed by parentheses, { }, whereas optional arguments are enclosed by square brackets, [].

Commands end on whitespace, the end of their arguments, or a non alphanumeric. Compare:

```
\LaTeX is great!    \LaTeX is great!  
\LaTeX{} is great! \LaTeX is great!  
\LaTeX\ is great!  \LaTeX is great!
```

The space after `\LaTeX` is interpreted as the end of the command, not an inter-word space.

Lines and paragraphs

Text within a paragraph is reflowed without regard for the original linebreaks. A paragraph is ended by a blank line. A new line may be forced with the command `\`, which has an optional argument of the space to leave before the next line: `\ [1ex]`.

It is often necessary to introduce non-breaking spaces, particularly after titles or before units, such as ‘Mr Smith’ and ‘2 m’. In \LaTeX a tilde is a non-breaking space.

It is sometimes useful to have a ‘blank’ line in the source which does not trigger the end of a paragraph. A line containing simply a `%` (\LaTeX ’s comment character) suffices.

The line spacing in a paragraph is mostly determined by the text size at the point at which the paragraph ends, not by the largest font therein.

The line spacing in a paragraph takes very little notice of inconveniently tall objects such as the Gaussian expression e^{-x^2} appearing.

Units

\LaTeX supports the obvious units: in, pt, cm, mm. Pendants will be amused that \LaTeX defines a point to be $1/72.27$ inches, not the $1/72$ inches used by PostScript.

Sometimes it is useful to use units related to the current font size. For this there exist ex (approx. the height of an ‘x’), and em (approx. the width of an ‘M’).

One must always use some unit, even for a length of zero. Otherwise, a warning will be given, and the default of pt will be used. The space between the number and the unit is optional.

One can also use page dimensions, and end up
here.

```
\hspace*{0.3\textwidth}here.
```

Lengths

Some lengths are rigid, some are rubber, and some infinitely elastic. Paragraph indentation (if you believe in it) is rigid.

Paragraph separation is typically rubber, for instance,

```
\setlength{\parskip}{5.5pt plus 1pt minus 1pt}
```

This allows L^AT_EX to adjust the length within the range given to fill the page more evenly.

Some lengths are infinitely, but equally, elastic:

```
\hspace*{\fill}Centred!\hspace*{\fill}
```

Centred!

The line spacing in a paragraph takes notice of `\vspace{0.2em}` appearing before any objects, including e^{-x^2} .

The non-starred forms `\hspace` and `\vspace` disappear if used at the beginning or end of a line/page. The use of `\vspace` in a paragraph affects only the space below the current line, not all the lines in that paragraph.

Scope

For most purposes, parentheses and environments delimit the scope of commands.

Environments, which are delimited by `\begin{foo}` and `\end{foo}` pairs, can be nested. The obvious example is the document environment which encloses the whole of the document.

A `{\Large large}` word.

```
\begin{center}
```

```
\Large
```

```
More large words
```

```
\end{center}
```

```
Normal again.
```

A **large** word.

More large words

Normal again.

Fonts

Lesser fonts (TrueType, Type 1, etc.) have a single scaling parameter. A 12 point font rendered at 600dpi is identical (as a bitmap) to a 24 point font rendered at 300dpi.

Not so with $\text{T}_{\text{E}}\text{X}$. It knows that small fonts should be bolder and more spaced than simple scaling would imply. Indeed, there are many differences a font designer may wish to make. Thus each font size has an entirely separate description. The 10 point scalable font description can produce a 10 point font at any resolution, but it cannot produce (properly) a 5 or 15 point font. The basic Computer Modern fonts exist at point sizes of 5, 6, 7, 8, 9, 10, 12 and 17.

Computer Modern
Computer Modern

The top line is Computer Modern Roman 5pt scaled to 30pt, the bottom Computer Modern Roman 17pt scaled to 30pt. Yes, one can scale them to any size.

A Big Family

The Computer Modern family is really several font families. It includes a serif family, a sans-serif families, both also available in bold and italic, as well as a monospaced font and a font for equations. These fonts all look coherent when mixed.

However, some believe that they also look dreadful, so wish to change them. However, remember that one must change all families in a consistent fashion. A document which has bits in Computer Modern and bits not tends to look much worse than one which is consistent.

Times for a change

```
\usepackage{times}
```

makes the default font family Times Roman, and uses Helvetica for the sans-serif family, and Courier for the monospaced family. At this point the standard PostScript fonts will be used in dvips's output, with no need to embed bitmapped fonts in the documents.

Of course, large titles should be in a font such as Helvetica-Narrow, not plain Helvetica, due to the spacing issues mentioned above.

Foreign

Foreigners place squiggles over and under letters. In Word, there are four different forms of the lower-case ‘e’, and similarly for ‘a’, and one cannot add accents to arbitrary letters. \LaTeX has the common accents as zero-width characters, and knows how to position them correctly. So one can type:

<code>\hr{"o}dinger</code>	<code>\Shrödinger</code>	<code>\gar\c{c}on</code>	<code>\garçon</code>
<code>p\^{a}t\prime{e}</code>	<code>\pâté</code>	<code>\premi\`{e}re</code>	<code>\première</code>
<code>\prime{E}t\prime{e}</code>	<code>\Été</code>	<code>\se\~{n}or</code>	<code>\señor</code>

There are other useful foreign squiggles too:

<code>\AA{}ngstrom</code>	<code>\Ångstrom</code>	<code>\O rsted</code>	<code>\Ørsted</code>
<code>Z\l{}oty</code>	<code>\Złoty</code>	<code>\strau\ss e</code>	<code>\strauße</code>

The letters ‘i’ and ‘j’ must lose their dots before gaining accents. Dotless forms exist: `\prime{\i}` is í.

English

In English typesetting the combinations fi, ff, fl and ffi are treated specially, especially in a serified font. Compare

difficult and difficult

difficult and difficult

This is done automatically.

Words such as mediæval and encyclopædia need manual intervention.

For currency, try `\pounds 100 (£100)`.

The above two ‘difficult’ lines are in Times Roman and Computer Modern. Fonts which started life in the PostScript world tend to have the ligatures ‘fl’ and ‘fi’ only.

The ligatures `\ae` and `\oe` always exist, along with their capitalised forms `\AE` and `\OE`.

`{\fontsize{30pt}{35pt}\usefont{OT1}{ptm}{m}{n} dif{f}icult}` is the code used for the top right ‘difficult.’

Tables × 1

Tables exist, with an arbitrary number of columns each with three possible alignments. Columns are separated by `&`, and lines ended with `\\`. Vertical lines can be introduced with `|`, and horizontal ones with `\hline`.

```
\begin{tabular}{c|cc}
& {\bf Gnus} & {\bf Geese} \\
\hline
1990 & 1 & 1,000 \\
2000 & 10 & 1,234 \\
\end{tabular}
```

	Gnus	Geese
1990	1	1,000
2000	10	1,234

Note no figure environment. This could have been placed in a centered environment too.

Tables × 2

Decimal alignment is harder, and a bit of a cheat.

```
\begin{tabular}{c|r@{.}l}  
Constant & \multicolumn{2}{c}{Value} \\ \hline  
$\pi$ & 3&1415 \\ $4\pi$ & 12&5 \\ \end{tabular}
```

Constant	Value
π	3.1415
4π	12.5

Tables × 3

Column widths are chosen to typeset the largest entry in each column on a single line. If, instead, one wants a fixed column width, with text flowing like a paragraph therein, this is possible.

```
\begin{tabular}{|c|p{3in}|} \hline
Labor & Crypto-communists \\ \hline
Literal Demagogues & See Labor \\ \hline
Conservationists & Generally well-meaning old buffers who
are too inept to be corrupt \\ \hline
\end{tabular}
```

Labor	Crypto-communists
Literal Demagogues	See Labor
Conservationists	Generally well-meaning old buffers who are too inept to be corrupt

Equations, boxes and counters

$$\nabla^2 \phi = 0 \tag{1}$$

$$\nabla^2 \phi = 0 \tag{2}$$

$$\nabla^2 \phi = 0 \tag{3}$$

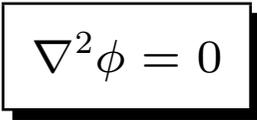
```
\begin{equation}
\nabla^2\phi=0
\end{equation}
```

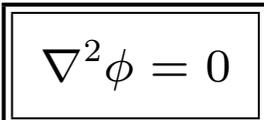
```
\begin{center}
\fbbox{\parbox{5in}}{
\begin{equation}
\nabla^2\phi=0
\end{equation}
}}
\end{center}
```

```
\hspace*{\fill}
\fbbox{\parbox{3in}}{
\vspace{-.3in}
\begin{displaymath}
\nabla^2\phi=0
\end{displaymath}
\vspace{-.4in}
}}
\hspace*{\fill}
\refstepcounter{equation}(\theequation)
```

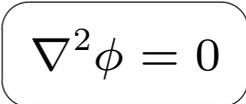
Better Boxes

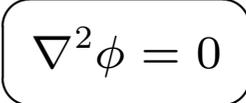
The `fancybox` package provides a nice variety of more stylish boxes by providing commands which can be used in place of `\fbox`.

`\shadowbox` 

`\doublebox` 

`\doublebox{\$ \nabla^2 \phi = 0 \$}` etc.

`\ovalbox` 

`\Ovalbox` 

Colour

The package `color` gives one access to colour and two more boxes.

Nature, `{\color{red} red}` in tooth & claw
Remember, `{\color{red} $\pi \neq 3.14$}`

`\colorbox{yellow}{$\nabla^2\phi=0$}`

`\fcolorbox{blue}{yellow}{$\nabla^2\phi=0$}`

Nature, **red** in tooth & claw
Remember, **$\pi \neq 3.14$**

$$\nabla^2\phi = 0$$

$$\nabla^2\phi = 0$$

Arbitrary colours with:

```
\definecolour{darkgreen}{rgb}{0,.5,0}  
\definecolour{palegreen}{rgb}{.5,1,.5}
```

Predefined colours include black, red, green, yellow, blue, magenta, cyan, white.

Graphics

Unfortunately \LaTeX escaped before its graphics package was fully completed. So, whereas people ought to use the `graphicx` package (or maybe `graphics`, the cut-down version), many still cling to `epsfig`. They should not.

```
\usepackage{graphicx}
...
\includegraphics[width=4in]{foo.eps}
...
\includegraphics[width=3in,height=4in,angle=30]{bar.eps}
```

As ever in \LaTeX , one can use millimetrics (mm), centimetrics (cm), points (pt), and many other units if preferred.

Simple Graphics

The result of the `\includegraphics` command is treated just like any other letter. If one wants it in a paragraph of its own, it needs blank lines before and after it, or to be in a `center` environment. If one wants two images on the same line with a one inch space between them, then

```
\includegraphics[width=2in]{foo.eps}  
\hspace{1in}  
\includegraphics[width=2in]{bar.eps}
```

Placing a small figure in the middle of text  is trivial. And one should surely use EPS if using `latex`, and PDF if using `pdflatex`. One can try supplying both, and specifying the file name without any extension.

Graphics and Boxes

Echoing the example from the EPS lectures:

Normal
Stretched
And rotated

```
Normal\\  
\scalebox{2}[1]{Stretched}\\  
\rotatebox{40}{And rotated}
```

(Unfortunately `xdvi` cannot display this correctly.)

Yet More Boxes

The above boxes are typeset in LR mode: \LaTeX simply keeps going, left to right, on a single line. There is another box which uses \LaTeX 's paragraph mode, in which automatic line-breaking occurs. The distinction between LR mode and paragraph mode also occurs in the tabular environment, and many other places. The width of things in paragraph mode must be specified, and, for `\parbox`, the optional argument specifies central (default), top (t) or bottom (b) vertical alignment.

¹In principio erat Verbum, et Verbum erat apud Deum, et Deus erat Verbum. ²Hoc erat in principium apud Deum.

¹In the beginning was the Word, and the Word was with God, and the Word was God. ²The same was in the beginning with God.

```
\parbox[t]{3in}{ $\text{\$}^1\text{\$}$ In principio...} \hspace{0.5in}  
\parbox[t]{3in}{ $\text{\$}^1\text{\$}$ In the beginning...}
```

Floats

A float has a caption, a number, and is placed at the top, or bottom, of a page. It is not placed at the point of inclusion in the document, but rather at some point thereafter. This is because real publishers do not place figures with text before and after them. Both figures and tables are floats, and act independently. The following rules are obeyed:

Neither figures nor tables are reordered.

No more than `\topfraction` of the top of a page is used by floats. Default 0.7.

No more than `\bottomfraction` of the bottom of a page is used by floats. Default 0.3.

The minimum fraction of text on a page is `\textfraction`. Default 0.2.

The minimum fill of a dedicated float page is `\floatpagefraction`. Default 0.5.

Any specified position parameters are obeyed.

Other rules include the number of floats which may appear at the top (or bottom) of the page, and the separation between them. Defaults may vary from between classes: the above are for the report class.

The parameters can be modified: `\renewcommand{\topfraction}{0.5}`.

Log Jams

It is easy to create a log-jam with floats. Require a float which is 45% of the height of the page to go at the bottom. It cannot, nor can it go on a page of its own. Follow it with another float which is 65% of the height of the page. The pair will not fit on a dedicated float page, nor can the second ever overtake the first.

Log jams are always flushed at the end of a chapter or document.

The optional position parameters for a float are ‘t’ (top), ‘b’ (bottom), ‘p’ (dedicated float page), ‘h’ (precisely here). The default is ‘tbp’. Adding an ‘!’ causes most of the fraction constraints above to be ignored, so that ‘b!’ will work on the figure suggested.

Content Free

Tradition may place a tabular environment after a `\begin{table}`, and an `\includegraphics` command after `\begin{figure}`, but this is optional. One can place almost anything within the table or figure.

```
\begin[tp]{table}
\includegraphics{scanner.eps}
\caption{Here's one I scanned in earlier}
\label{tbl:StolenGoods}
\end{table}
```

The default caption is typeset in a box whose width is the same as the page text-width. This makes it hard to distinguish multi-line captions from the main text. One can change this behaviour, but this margin is insufficient for the proof.

Labels, counters and references

Most uses of counters (numbered equations, figures, tables) cause a reference to be set. A `\label` command associates a label to which one can later (or earlier) refer with this reference. One can then extract both the counter number and page number from the reference.

```
\begin{figure}
...
\caption{An interesting figure}
\label{fig:interesting}
\end{figure}
\begin{equation}
E=mc^2
\label{eqn:relativity}
\end{equation}
```

An interesting figure, Fig.~\ref{fig:interesting}, appears on page~\pageref{fig:interesting} and relates to equation~\ref{eqn:relativity}.

As the `\caption` command is the bit of the float which manipulates the counter, the `\label` must go after the `\caption`.

More labels, counters &c.

A label outside a float or equation can be used for finding page numbers.

```
\label{pg:ex}This text is on page~\pageref{pg:ex}.
```

This text is on page 36.

Counters can be manipulated:

```
\setcounter{chapter}{3}
```

and interrogated:

```
This is page~\thepage. This is page 36.
```

```
H\ae c est pagina~\roman{page}. Hæc est pagina xxxvi.
```

Preceding a counter name with `\the` prints it in the default style for that counter. One can choose the style explicitly: `arabic`, `roman`, `Roman`, `alph` and `Alph`.

Other counters include `chapter`, `section`, `subsection` and `footnote`.

Macros

Fortunately it is easy to define macros, including those with arguments:

```
\newcommand{\equn}[1]{equation~(\ref{eqn:#1})}  
\newcommand{\Equn}[1]{Equation~(\ref{eqn:#1})}
```

allows one to type

in `\equn{Schr}` it is seen that

instead of in `equation~(\ref{eqn:Schr})` it is seen that

and allows one to change one's style of referencing equations trivially.

Using 'eqn:', 'fig:' and 'tab:' as the first characters of a label is a mere convention.

Contents

The command `\tableofcontents` produces a table of contents. On the first run of `latex` it will be blank. On the second, it will read the `.toc` file generated by the first. The `chapter` and other sectioning commands automatically write a line to the contents.

The counter `tocdepth` defines the least significant unit added automatically to the table of contents:

0: chapter; 1: section; 2: subsection; 3: subsubsection.

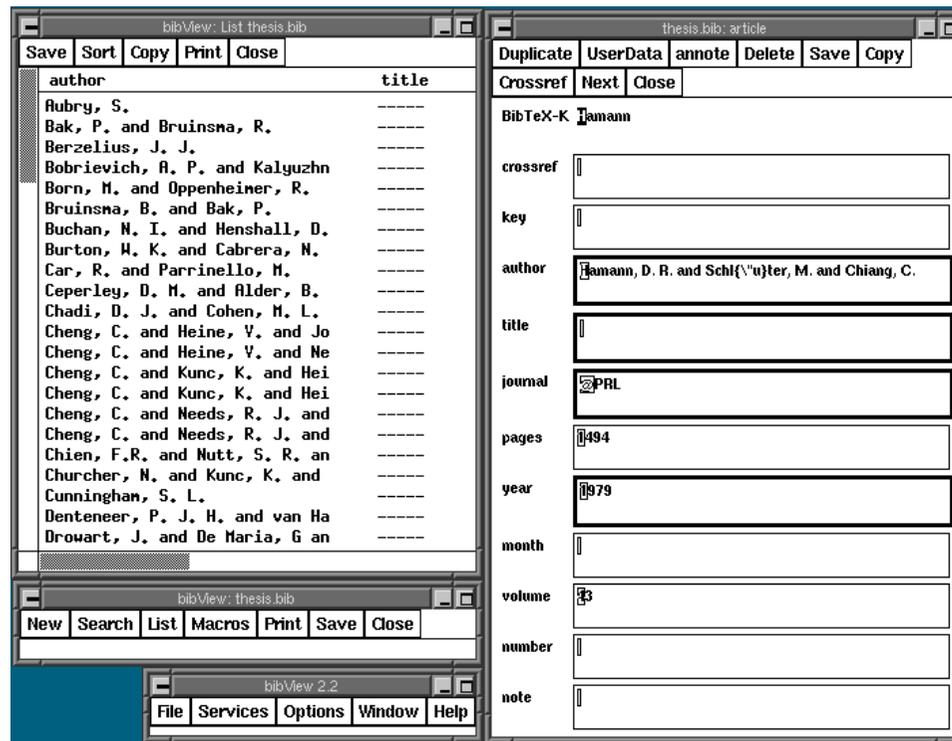
To include sections automatically and subsections manually:

```
\setcounter{tocdepth}{1}
...
\subsection{Really Interesting}
\addcontentsline{toc}{subsection}{Really Interesting}
```

The `foils` and `letter` classes do not support tables of contents.

Bibliographies

Bibliographies can be maintained by hand or with the ancient `bibview` command.



Bibliographies (2)

The idea is that one bibliography database, a `.bib` file, contains all the items you will ever wish to cite, and then `LATEX` can extract just the entries needed for a given document.

```
@STRING{PRL = "Phys. Rev. Lett."}
```

```
@article{Hamann,  
  author = {Hamann, D. R. and Schl{"u}ter, M. and Chiang, C.},  
  journal = PRL,  
  year = {1979},  
  volume = {43},  
  pages = {1494}  
}
```

Note the use of `@STRING` for defining a macro. Note also that rules on the quoting of commands, including accents, in `.bib` files are much stricter than those in normal documents.

Bibliographies (3)

To include a bibliography, one could use the commands

```
\addcontentsline{toc}{chapter}{Bibliography}  
\begin{singlenspace}  
\bibliographystyle{unsrt}  
\bibliography{bib/thesis}
```

assuming that the file `bib/thesis.bib` existed.

Making citations is as easy as `\cite{Hamann}` which will produce [42], after running `latex`, then `bibtex`, then `latex`, then `latex`.

Multiple, comma-separated, databases can be specified to `\bibliography`.

The `cite` package tidies up multiple entries, so that `\cite{foo,bar,womble}` gets ordered sensibly.

If one is really bored, one can customise the style of the entries. Try `latex makebst`.

Emacs can keep your bibliography in order whilst making tea, reformatting your programs in vile colours, and psycho-analysing you.

Letters

The letter class in \LaTeX is rather US-biased. The result looks very odd to those educated in England. The following coerces things into a slightly saner format, but clearly one can do much more rearrangement, and even play with including one's favourite logo too.

Although setting up a template, or class, to look precisely how you would like it to look might take some time, it needs doing only once. And, with luck, you can steal one from someone else anyway.

```

\documentclass[a4paper]{letter}
\usepackage{times}

\parindent 3em
\setlength{\parskip}{5pt plus 0pt minus 1pt}
\longindentation=\parindent
\indentedwidth=\textwidth
\advance\indentedwidth -\longindentation

\begin{document}
\name{Prof. Ab St.Myndid}
\date{30th February 1999}
\address{TCM, \\ Cavendish Laboratory, \\ Madingley Road, \\ Cambridge. \\ CB3 0HE UK}
\newcommand{\toname}{Dr A Knut,}
\newcommand{\toaddress}{University of Lower Gigglesdale, \\
    Lower Gigglesdale, \\ C. Yorks. L0 5T}

\opening{\noindent Dear Sir,}

Following your communication of 22nd {\it inst.}, I would like to
convey my utter contempt for all the tedious ideas expressed
therein. I cannot begin to express how painfully dull and utterly
unoriginal I found your opinions. Have you ever considered applying
for a chair at Oxford?

\closing{Yours sincerely,}
\end{document}

```

TCM,
Cavendish Laboratory,
Madingley Road,
Cambridge.
CB3 0HE UK

30th February 1999

Dr A Knut,
University of Lower Gigglesdale,
Lower Gigglesdale,
C. Yorks. L0 5T

Dear Sir,

Following your communication of 22nd *inst.*, I would like to convey my utter contempt for all the tedious ideas expressed therein. I cannot begin to express how painfully dull and utterly unoriginal I found your opinions. Have you ever considered applying for a chair at Oxford?

Yours sincerely,

Prof. Ab St.Myndid

Viewing, printing, etc.

On-screen viewing of `.dvi` files is most obviously done with `xdvi`, perhaps with the option `'-paper a4r'` for a document like this one.

With a default `LATEX` installation, `dvips foo.dvi` converts the `.dvi` file to PostScript, embeds bitmapped fonts, and sends it to the default printer. This is rarely what was wanted.

The more useful `dvips -Ppdf foo.dvi` converts the `.dvi` file to PostScript, embeds scalable fonts, and saves it as `foo.ps`. This is useful, and has (almost) nothing to do with PDF.

For PDF one wants to use `dvipdfm`, or, maybe, `PDFLATEX` if one requires hyperlinks.

For EPS, one wants something like:

```
dvips -Ppdf -E foo.dvi
```

Talks, Posters, Equations, Feynman Diagrams, etc.

Would require another lecture, and are things of which others have more experience than I.
I am sure I would enjoy attending such a lecture. . .

However, for the bored, there follow a few miscellaneous examples.

Random Equations

$$A_{ij} = \begin{cases} (k_{i-1} + k_i)/m_i & j = i \\ -k_i/\sqrt{m_i m_j} & j = i \pm 1. \end{cases} \quad (4)$$

$$\underbrace{\alpha + \cdots + \omega}_{24}$$

```

\begin{equation}
A_{ij} = \left\{ \begin{array}{ll}
(k_{i-1} + k_i) / m_i & \text{\quad} \& j=i \text{\quad} \backslash \\
-k_i / \sqrt{m_i m_j} & \text{\quad} \& j=i \text{\quad} \pm 1. \\
\end{array} \right. \\
\end{equation}
\[\underbrace{\alpha + \cdots + \omega}_{24} \]

```

More Random Equations

Never $r \sin(\theta)$, but $r \sin(\theta)$, or $r \sin(\theta)$.

Not $\int x dx$ but $\int x dx$.

Not $\nu \textit{differs from} \eta$, nor $\nu \textit{differs from} \eta$, but $\nu \textit{differs from} \eta$, or $\nu \textit{differs from} \eta$.

(Watch inter-letter, as well as inter-word, spacing, and maths italic is not identical to italic.)

Never $r \sin(\theta)$, but $r \sin(\theta)$,
or $r \mathrm{\sin}(\theta)$.

Not $\int x dx$ but $\int x, dx$.

Not $\nu \textit{differs from} \eta$, nor $\nu \textit{differs from} \eta$,
but $\nu \textit{differs from} \eta$,
or $\nu \textit{differs from} \eta$.

Equations Inline

Note that $\sum_{n=1}^{\infty} \frac{1}{n}$ is the inline form of

$$\sum_{n=1}^{\infty} \frac{1}{n}$$

This movement of subscripts also happens with `\lim`.

Although \LaTeX tries to cope with the lack of vertical space available for inline equations, it is usually best avoided for all but the simplest expressions.

`\sum_{n=1}^{\infty} \frac{1}{n}` in both cases.

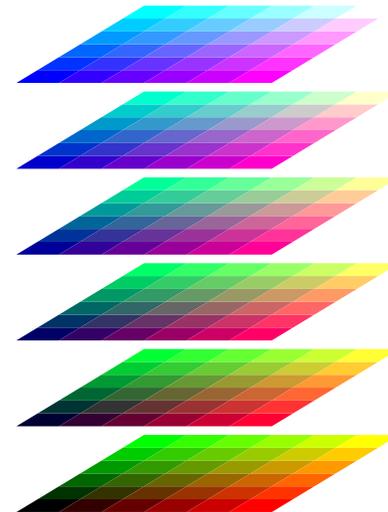
Random Graphics

These lines are short so, by using `\raisebox` to lie about the height of the graphic, we can easily stick something tall on the right.

```
\raisebox{height to raise}[optional fake height]
```

(This is more likely to occur beside a tabular environment.)

The Netscape Colour Cube



```
These lines are short so, by\\  
... \\  
beside a tabular environment.)\\  
\hspace*{\fill}\raisebox{0pt}[1ex]  
{\includegraphics[width=2in]{ns_cube.eps}}
```

Plagiarism

Just as one learns \LaTeX by copying from other people (and there are many examples in TCM: papers, theses, some posters, dull talks by Rutter), so too can one write booklets by plagiarism.

Plagiarism is the sincerest form of flattery, and ‘The Not So Short Introduction to $\text{\LaTeX} 2_{\epsilon}$ ’ is GPLed, so I doubt its authors will mind my lifting the following pages from it. These pages do not include the AMS Maths Symbols.

Maths Symbols, Relations

\lt	<code><</code>	\gt	<code>></code>	\equiv	<code>=</code>
\leq	<code>\leq or \le</code>	\geq	<code>\geq or \ge</code>	\equiv	<code>\equiv</code>
\ll	<code>\ll</code>	\gg	<code>\gg</code>	$\dot{=}$	<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>
\sqsubseteq	<code>\sqsubseteq</code>	\sqsupseteq	<code>\sqsupseteq</code>	\bowtie	<code>\bowtie</code>
\in	<code>\in</code>	\ni	<code>\ni , \owns</code>	\propto	<code>\propto</code>
\vdash	<code>\vdash</code>	\dashv	<code>\dashv</code>	\models	<code>\models</code>
\mid	<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 or \ne</code>

Maths Symbols, Operators

+	<code>+</code>	-	<code>-</code>		
±	<code>\pm</code>	∓	<code>\mp</code>	◁	<code>\triangleleft</code>
·	<code>\cdot</code>	÷	<code>\div</code>	▷	<code>\triangleright</code>
×	<code>\times</code>	\	<code>\setminus</code>	★	<code>\star</code>
∪	<code>\cup</code>	∩	<code>\cap</code>	*	<code>\ast</code>
⊔	<code>\sqcup</code>	∏	<code>\sqcap</code>	○	<code>\circ</code>
∨	<code>\vee , \lor</code>	∧	<code>\wedge , \land</code>	●	<code>\bullet</code>
⊕	<code>\oplus</code>	⊖	<code>\ominus</code>	◇	<code>\diamond</code>
⊙	<code>\odot</code>	⊗	<code>\otimes</code>	⊕	<code>\uplus</code>
⊗	<code>\otimes</code>	◯	<code>\bigcirc</code>	∥	<code>\amalg</code>
△	<code>\bigtriangleup</code>	▽	<code>\bigtriangledown</code>	†	<code>\dagger</code>
‡	<code>\ddagger</code>	∫	<code>\int</code>		

Maths Symbols, 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>
\Lleftarrow	<code>\Lleftarrow</code>	\Longleftarrow	<code>\Longleftarrow</code>	\Uparrow	<code>\Uparrow</code>
\Rrightarrow	<code>\Rrightarrow</code>	\Longrightarrow	<code>\Longrightarrow</code>	\Downarrow	<code>\Downarrow</code>
\Leftrightarrow	<code>\Leftrightarrow</code>	\Longleftrightarrow	<code>\Longleftrightarrow</code>	\Updownarrow	<code>\Updownarrow</code>
\mapsto	<code>\mapsto</code>	\longmapsto	<code>\longmapsto</code>	\nearrow	<code>\nearrow</code>
\hookrightarrow	<code>\hookrightarrow</code>	\hookleftarrow	<code>\hookleftarrow</code>	\searrow	<code>\searrow</code>
\leftarrowharpoonup	<code>\leftarrowharpoonup</code>	\rightarrowharpoonup	<code>\rightarrowharpoonup</code>	\swarrow	<code>\swarrow</code>
\leftarrowharpoonright	<code>\leftarrowharpoonright</code>	\rightarrowharpoonright	<code>\rightarrowharpoonright</code>	\nwarrow	<code>\nwarrow</code>
\rightleftharpoons	<code>\rightleftharpoons</code>	\iff	<code>\iff</code> (bigger spaces)		

Maths Symbols, Miscellaneous

...	<code>\dots</code>	⋯	<code>\cdots</code>	:	<code>\vdots</code>	⋱	<code>\ddots</code>
\hbar	<code>\hbar</code>	\imath	<code>\imath</code>	\jmath	<code>\jmath</code>	ℓ	<code>\ell</code>
\Re	<code>\Re</code>	\Im	<code>\Im</code>	\aleph	<code>\aleph</code>	\wp	<code>\wp</code>
\forall	<code>\forall</code>	\exists	<code>\exists</code>	∂	<code>\partial</code>		
'	<code>'</code>	'	<code>\prime</code>	\emptyset	<code>\emptyset</code>	∞	<code>\infty</code>
∇	<code>\nabla</code>	\triangle	<code>\triangle</code>	\langle	<code>\langle</code>	\rangle	<code>\rangle</code>
\perp	<code>\perp</code>	\top	<code>\top</code>	\sphericalangle	<code>\sphericalangle</code>	\surd	<code>\surd</code>
\diamond	<code>\diamondsuit</code>	\heartsuit	<code>\heartsuit</code>	\clubsuit	<code>\clubsuit</code>	\spadesuit	<code>\spadesuit</code>
\neg	<code>\neg</code> or <code>\lnot</code>	\flat	<code>\flat</code>	\natural	<code>\natural</code>	\sharp	<code>\sharp</code>
ϑ	<code>\vartheta</code>	ϖ	<code>\varpi</code>	ς	<code>\varsigma</code>	φ	<code>\varphi</code>
\int	<code>\int</code>	\oint	<code>\oint</code>	\sum	<code>\sum</code>	\prod	<code>\prod</code>

Maths Spaces

<code>\!</code>	thin negative
<code>\,</code>	thin
<code>\:</code>	medium
<code>\;</code>	thick
<code>\space</code>	interword
<code>\quad</code>	1 em
<code>\qquad</code>	2 em