the **\documentclass** command like this:

```
\documentclass{report}
```

There are four default classes provided, and many others are available online:

report for business, technical, legal, academic, or scientific reports;

article for magazine or journal articles, reviews, conference papers, or research notes;

book for books and theses;

letter for letters.[2]

```
\documentclass[a4paper]{report}
```

The other default settings are for: *a*) 10pt type (all document classes); *b*) two-sided printing (books and reports) or one-sided (articles and letters); and *c*) separate title page (books and reports only). These can be modified with the following document class options which you can add in the same set of square brackets, separated by commas:

11pt to specify 11pt type (headings, footnotes, etc get scaled up or down in proportion);

12pt to specify 12pt type (headings scale);

oneside to format one-sided printing for books and reports;

twoside to format articles for two-sided printing;

titlepage to force articles to have a separate title page.

draft makes LaTeX indicate hyphenation and justification problems with a small black square in the right-hand margin of the problem line so they can be located quickly by a human.

```latex
\documentclass[11pt,a4paper,oneside]{report}
\usepackage[latin1]{inputenc}
\renewcommand{\abstractname}{Summary}
\begin{document}
```

Depth	Division	Command	Notes
−1	Part	\part	Only in books and reports
0	Chapter	\chapter	Only in books and reports
1	Section	\section	Not in letters
2	Subsection	\subsection	Not in letters
3	Subsubsection	\subsubsection	Not in letters
4	Titled paragraph	\paragraph	Not in letters
5	Titled subparagraph	\subparagraph	Not in letters

Level	Default	Counter	Label command
1	digit.	enumi	\theenumi
2	(letter)	enumii	\theenumii
3	roman.	enumiii	\theenumiii
4	LETTER.	enumiv	\theenumiv

Note that each counter and command ends with the Roman numeral value of its level (this is to overcome the rule that LaTeX commands can only be made of letters). To change the format of a numbered list item counter, just renew the meaning of its label:

```
\renewcommand{\theenumi}{\alpha{enumi}}
\renewcommand{\theenumii}{\roman{enumii}}
\renewcommand{\theenumiii}{\arabic{enumiii}}
```

Counter	What changes	Command
enumi	numeral	\renewcommand{\theenumi}{\arabic{enumi}}
	label	\renewcommand{\labelenumi}{(\theenumi)}
enumii	numeral	\renewcommand{\theenumii}{\alph{enumii}}
	label	\renewcommand{\labelenumii}{(\theenumii)}
enumiii	numeral	\renewcommand{\theenumiii}{\roman{enumiii}}
	label	\renewcommand{\labelenumiii}{(\theenumiii)}
enumiv	numeral	\renewcommand{\theenumiv}{\Alph{enumiv}}
	label	\renewcommand{\labelenumiv}{(\theenumiv)}

Table 8: Default Settings for Enumerate Counters

Tabulky

How it appears	What you write

<table><tr><td>-110</td><td>-120.12</td><td>-130</td></tr><tr><td>210</td><td>220.</td><td>230</td></tr></table>	`\begin{tabular}{|l|c|r|} \hline`
	`-110 &  120 & -130 \\ \hline`
	`210 & -220 &  230 \\ \hline`
	`\end{tabular}`

Figure 20: A 2 × 3 Table with Horizontal and Vertical Lines

```
\begin{center}
\begin{tabular}{l|cc|c}
          & \multicolumn{2}{|c|}{Test number} \\
  \multicolumn{1}{c|}{Student} &    1    &    2    & Average \\ \hline
              Bill           &   67    &   72    &   70.5  \\
              Charleetah     &   72    &   67    &   70.5  \\ \hline
          & \multicolumn{2}{c}{Taken in class}        \\ \cline{2-3}
\end{tabular}
\end{center}
```

Figure 26: Multicolumn Source (Result in Figure 27)

Student	Test number		Average
	1	2	
Bill	67	72	70.5
Charleetah	72	67	70.5
	Taken in class		

| What you see	What you write
1-3 sting like a bee 4-6-8don't be late	``` \begin{tabbing} 1-3 \= sting like a bee \\ 4-6-8 \> don't be late \\ \end{tabbing} ```
1-3 sting like a bee 4-6-8 don't be late	``` \begin{tabbing} 4-6-8 \= don't be late \kill 1-3 \> sting like a bee \\ 4-6-8 \> don't be late \\ \end{tabbing} ```

Table 5: The \kill Tabbing Command

Font family	Code
Roman (serif, with tails on the uprights), the default	rm
Sans–serif, with no tails on the uprights	sf
Monospace (fixed-width or typewriter)	tt

What you write		How it appears
`This is \textbf{boldface}.`	⇒	This is **boldface**.
`This is \textit{italic}.`	⇒	This is *italic*.
`This is \textrm{roman}.`	⇒	This is roman.
`This is \textsc{small caps}.`	⇒	This is SMALL CAPS.
`This is \textsf{sans serif}.`	⇒	This is sans serif.
`This is \textsl{slanted}.`	⇒	This is *slanted*.
`This is \texttt{typewriter}.`	⇒	This is `typewriter`.

Table 1: Intrinsic Font Styles

What you write		What you see
\"{a}	⇒	ä
\'{e}	⇒	è
\'{i}	⇒	í
\~{o}	⇒	õ
\^{u}	⇒	û
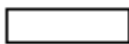
Table 3: Some Accents for Letters
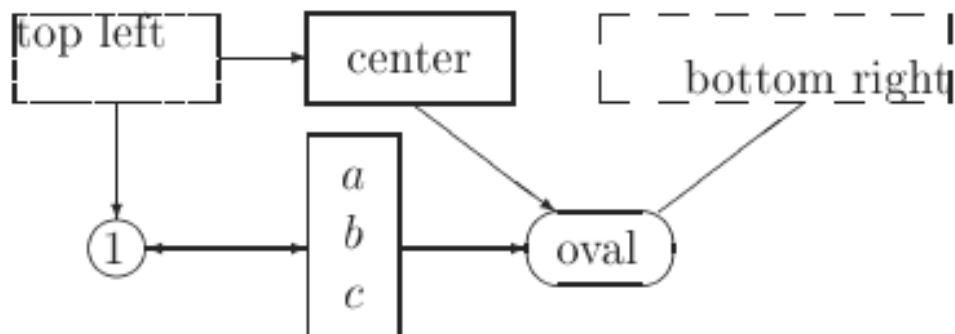
```
\begin{center} \setlength{\unitlength}{1in}
\begin{picture}(0,0)
  \put( 0,  0){\circle*{.1}}
  \put( 0,-.5){\framebox(.7,.3){center} }
  \put(-1,-.5){\dashbox{.01}(.7,.3)[tl]{top left} }
  \put( 1,-.5){\dashbox{.1}(1.2,.3)[br]{bottom right} }
  \put(-.65, -1){\circle{.2}} \put(-.7,-1.05){1}
  \put( 1, -1){\oval(.5,.25)} \put(.85,-1.05){oval}
  \put(0,-1){\fbox{$\begin{array}{c}a\\b\\c\end{array}$}}
  \put(-.3,-.35){\vector(1,0){.3}}
  \put(-.65,-.5){\vector(0,-1){.4}}
  \put( .35,-.5){\vector(4,-3){.5}}
  \put(-.55,-1){\vector(1,0){.55}}
  \put( 0,-1){\vector(-1,0){.55}}
  \put(.32,-1){\vector(1,0){.43}}
  \put(1.2,-.895){\line(1,1){.3975}}
\end{picture}
\end{center} \vspace{1in}
```

`psframe` $(x_0, y_0)\,(x_1, y_1)$ ▭ `\psframe(0,1)(10,-2)`	Draws rectangle with a corner at (x_0, y_0) and opposite corner at (x_1, y_1).
`pscircle` $(x, y)\{r\}$ ○ `\pscircle(5,0){2}`	Draws circle centered at (x, y) with radius $= r$.
`psellipse` $(x, y)\,(r_x, r_y)$ ⬭ `\psellipse(3,0)(5,2)`	Draws ellipse centered at (x, y) with horizontal radius $= r_x$ and vertical radius $= r_y$

`psline`$\{a\}(x_0, y_0)\ldots(x_n, y_n)$
 	
 —— `\psline{-}(0,0)(10,0)`
 `\psline{<->}`
 `(0,0)(5,-2)(1,0)`
 `\psline{|-*}`
 `(0,0)(10,-2)`
	Draws line or arrow, determined by a:
	    - no arrow; -> forward arrow;
	   <-> double arrow' <- backward arrow;
	 (there are more!), along path given by coordinates.

`pspolygon`$(x_0, y_0)\ldots(x_n, y_n)$ ◺ `\pspolygon(0,0)` `(0,-3)(6,-3)`	Draws closed polygon with given coordinates; same as `\psline{-}` …, except figure is closed by drawing line from (x_n, y_n) to (x_0, y_0).

Double your fun

`\scalebox{2}{Double your fun}`

Open wide

`\resizebox{1in}{!}{\fbox{Open wide}}`

Reflect on this

`\reflectbox{Reflect on this}`

Landscape

`\rotatebox[origin=c]{90}{Landscape}`

Was Pythagoras a square?
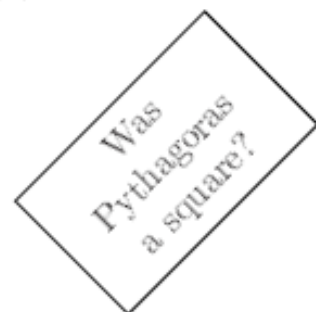
```
\rotatebox[origin=rt]{45}
 {\psframebox{
    \begin{tabular}{c}
 Was\\Pythagoras\\a square?
    \end{tabular}
}              }
```



```
\includegraphics
 {protractor.eps}
```
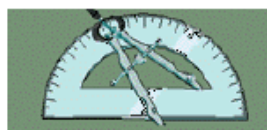


```
\includegraphics[width=.25\textwidth,
 height=!]{protractor.eps}
```



```
\includegraphics[height=.5in,width=!,
 angle=90,origin=c]{protractor.eps}
```

Typeface (font family)	Example	Package	Family
	METAFONT *fonts*		
* Computer Modern	The quick brown fox jumps over the lazy dog	(default)	cmr
CM Sans	The quick brown fox jumps over the lazy dog	(default)	cmss
CM Typewriter	The quick brown fox jumps over the lazy dog	(default)	cmtt
Pandora	The quick brown fox jumps over the lazy dog	pandora	panr
Pandora Sans	The quick brown fox jumps over the lazy dog	pandora	pss
Universal	The quick brown fox jumps over the lazy dog	—	uni
* Concrete	The quick brown fox jumps over the lazy dog	concrete	ccr
BB Dingbats		—	ding[a]
Cypriot		—	cypr
Éireannach	Níl aon tinteán mar do tinteán féin	eiad	eiad
Etruscan		—	etr
Linear 'B'		—	linb
Phoenician		—	phnc
Runic		—	fut
Rustic	The quick brown fox jumps over the lazy dog	—	rust
Bard		—	zba
Uncial	The quick brown fox jumps over the lazy dog	—	uncl
Dürer	THE QUICK BROWN FOX JUMPS OVER THE	—	zdu
Yannis Fraktur	Fuchs, Du hast die Gans gestohlen, gib sie wieder her!	—	yfrak[a]
Yannis Gothic	Fuch, Du hat die Gan gestohlen, gib sie wieder her!	—	ygoth[a]
Yannis Schwäbische	Fuchs, Du hast die Gans gestohlen, gib sie wieder her!	—	yswab[a]

Char	Meaning	Examples
`f`	foundry	`b`=Bitstream, `m`=Monotype, `p`=Adobe PostScript
`nn`	typeface name	`ba`=Baskerville, `tm`=Times, `pl`=Palatino
`ss`	series/shape	`r`=roman, `bi`=bold italic
`ee`	encoding	`8a`=default 8–bit ANSI, `ly`=Y&Y's TEX'n'ANSI
`c`	[small]caps	(this is a literal 'c' character, used only if needed)

Adobe fonts

Bookman	The quick brown fox jumps over the lazy dog	bookman	pbk
New Century Schoolbook	The quick brown fox jumps over the lazy dog	newcent[b]	pnc
Palatino	The quick brown fox jumps over the lazy dog	palatino[c]	ppl
†Times New Roman	The quick brown fox jumps over the lazy dog	times[b]	ptm
Avant Garde	The quick brown fox jumps over the lazy dog	avant	pag
Helvetica	The quick brown fox jumps over the lazy dog	helvet	phv
Zapf Chancery	The quick brown fox jumps over the lazy dog	zapfchan	pzc
Courier	The quick brown fox jumps over the lazy dog	courier	pcr
Zapf Dingbats	✳❉✳ ❑◆✳✳✳ ❂❑❒❏■ ✳❑❏ ✳◆❂❒▲ ❑◆✳❑ ▼✳✳ ●❂❊❊ ✳❑✳	pifont	pzd[a]
Symbol	Τηε θυιχκ βροων φοξ φυμπσ οϖερ τηε λαζψ δογ	—	pzd[a]

X Consortium fonts

Charter	The quick brown fox jumps over the lazy dog	charter	bch
Nimbus Roman	The quick brown fox jumps over the lazy dog	—	unm
Nimbus Sans	The quick brown fox jumps over the lazy dog	—	unms
URW Antiqua	The quick brown fox jumps over the lazy dog	—	uaq
URW Grotesk	The quick brown fox jumps over the lazy dog	—	ugq
Utopia	The quick brown fox jumps over the lazy dog	utopia	put

8.2.2 Changing the font family temporarily

To shift to another font family on a temporary basis, group the text within curly braces to limit the scope of the font change, and use the commands **\fontencoding** (if needed), **\fontfamily**, and **\selectfont** commands *immediately inside* the opening curly brace, eg

```
{\fontfamily{phv}\selectfont Helvetica looks like this}
and {\fontencoding{OT1}\fontfamily{ppl} Palatino looks
like this}.
```

Helvetica looks like this and Palatino looks like this.

8.2.3 Changing font style

Within each typeface or font family there are usually several different styles of type. LaTeX distinguishes between font *family*, font *shape*, and font *series*:

Type style	Command	Example (using Computer Modern)
Upright (default)	\upshape*	The quick brown fox jumps over the lazy dog
Italic	\itshape	*The quick brown fox jumps over the lazy dog*
Slanted	\slshape*	*The quick brown fox jumps over the lazy dog*
Small Capitals	\scshape*	THE QUICK BROWN FOX JUMPS OVER THE LAZY DOG
Bold	\bfseries†	**The quick brown fox jumps over the lazy dog**
Bold Extended	\bfseries*	**The quick brown fox jumps over the lazy dog**
Sans-serif	\sffamily	The quick brown fox jumps over the lazy dog
Monospace	\ttfamily	The quick brown fox jumps over the lazy dog

Type style	Command	Example
Italic	\textit{a few words}	puts *a few words* into italics
Slanted	\textsl{a few words}	puts *a few words* into slanted type*
Small Capitals	\textsc{a few words}	puts A FEW WORDS into small caps
Bold	\textbf{a few words}	puts **a few words** into bold type
Sans-serif	\textsf{a few words}	puts a few words into sans-serif type
Monospace	\texttt{a few words}	puts a few words into typewriter type

These 'shape', 'series', and 'family' commands are ***commutative***, so you can combine a shape with a series and/or a family, as in:

```
...{\bfseries\itshape\sffamily bold italic sans-serif type}...
```

This gives you ***bold italic sans-serif type***, but beware of pushing your fonts beyond their limits unless you are a typographer. It is not normally meaningful to combine one shape or series class with another of the same class, such as trying to get slanted-italics. It's an impossibility to combine one family with another (such as a seriffed sans-serif typeface!). Slanted plus italics, for example, doesn't make sense, as italics are already slanted (although it is technically possible); and while some typefaces may well possess italic small caps, they are not in common use. Sans-serif and monospace (typewriter) are different fonts, and often different typeface families entirely.[4]

Command	Example	Nominal point size	Exact point size
\tiny	The quick brown fox jumps over the lazy dog	5	5
\scriptsize	The quick brown fox jumps over the lazy dog	7	7
\footnotesize	The quick brown fox jumps over the lazy dog	8	8
\small	The quick brown fox jumps over the lazy dog	9	9
\normalsize	The quick brown fox jumps over the lazy dog	10	10
\large	The quick brown fox jumps over the lazy	12	12
\Large	The quick brown fox jumps over t	14	14.40
\LARGE	The quick brown fox jumps o	18	17.28
\huge	The quick brown fox jum	20	20.74
\Huge	The quick brown fox	24	24.88

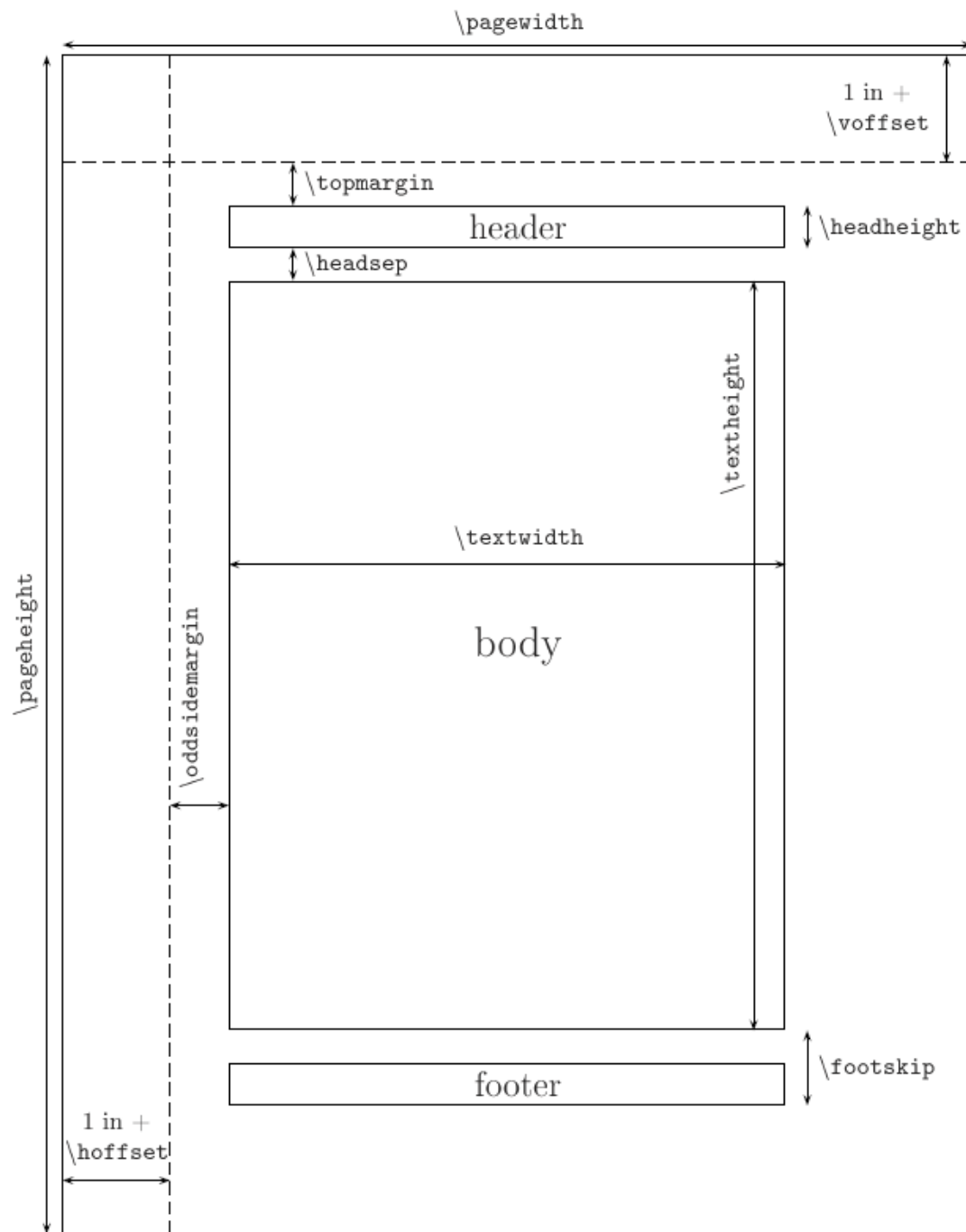| Unit	Size
	Printers' fixed measures
pt	Anglo–American standard points (72.27 to the inch)
pc	pica ems (12pt)
bp	Adobe 'big' points (72 to the inch)
sp	TeX 'scaled' points (65536 to the pt)
dd	Didot (European standard) points (67.54 to the inch)
cc	Ciceros (European pica ems, 12dd)
	Printers' relative measures
em	ems of the current point size (historically the width of letter 'M' but see below)
ex	x-height of the current font (height of letter 'x')
	Other measures
cm	centimeters (2.54 to the inch)
mm	millimeters (25.4 to the inch)
in	inches

\pagewidth

1 in + \voffset

\topmargin

header

\headheight

\headsep

\textheight

\textwidth

\pageheight

\oddsidemargin

body

footer

\footskip

1 in + \hoffset

```
@article{tex,
 author  = "Donald E. Knuth",
 title   = "The {\TeX} Book",
 publisher = "Addison-Wesley Publishing Company",
 address = "Reading, MA",
 year    = "1989",
 edition = "15th",
}
```

$$\texttt{@string}\{name = "string"\}$$

`article` refers to an article from a journal or magazine.

    Required fields: `author`, `title`, `journal`, `year`.

    Optional fields: `volume`, `number`, `pages`, `month`.

`book` refers to a book with an explicit publisher.

    Required fields: `author` or `editor`, `title`, `publisher`, `year`.

    Optional fields: `volume` or `number`, `series`, `address`, `edition`, `month`.

`booklet` refers to a bound, printed document, but without an explicit publisher.

    Required fields: `author` or `key`, `title`.

    Optional fields: `author`, `howpublished`, `address`, `month`, `year`.

`inproceedings` is an article in a conference proceedings.

    Required fields: `author`, `title`, `booktitle`, `year`.

    Optional fields: `editor`, `volume` or `number`, `series`, `pages`, `month`, `organization`, `publisher`, `address`.

`manual` is some technical documentation.

    Required fields: `author` or `key` (see note below). `title`.

    Optional fields: `author`, `organization`, `address`, `edition`, `month`, `year`.

```
\bibliography{mybiblio}
\bibliographystyle{plain}
```

plain is the most common because it formats entries according to accepted standards. Entries are sorted by the alphabetical order of author names, breaking ties with the year of publication, and they are labeled with numbers.

abbrv differs from plain by abbreviating names of journals, among other things (to give a more compact bibliography).

alpha differs from plain by citing by labels, rather than numbers.

unsrt differs from plain by sorting entries by the order in which they are cited, rather than by the author names.

What it is	How it is called (keyword)
Abstract	\abstractname
Appendix	\appendixname
Chapter	\chaptername
Contents	\contentsname
Index	\indexname
List of Figures	\listfigurename
List of Tables	\listtablename
Part	\partname
References	\refname for article style
	\bibname for book and report styles

Table 21: Intrinsic Name Parameters

Parameter	Current Setting[†]	Meaning
\footskip	30.0pt	space between bottom of body and top of footer
\headsep	25.0pt	space between bottom of header and top of body
\headheight	12.0pt	height of header
\hoffset	0.0pt	horizontal offset to add to indentation of body
\oddsidemargin	17.0pt	extra space added at left (applies only to odd numbered pages if the style is two-sided, in which case there is also an \evensidemargin parameter)
\paperheight	794.96999pt	height of the paper
\paperwidth	614.295pt	width of the paper
\textheight	548.5pt	height of the body
\textwidth	390.0pt	width of the body
\topmargin	17.0pt	space added before the top of the header
\voffset	0.0pt	vertical offset to add to indentation of body

[†]Printed using \the*parameter*

Parameter	Meaning
\itemsep	space added to \parsep between items in a list.
\parindent	indentation at beginning of paragraph.
\parsep	space between paragraphs in the same item of a list.
\parskip	space between paragraphs.

Table 23: Spacing Parameters

```
\begin{minipage}{3in}
Please make sure you send in your completed forms by January
1st next year, or the penalty clause 2(a) will apply.
\begin{itemize}
\item Incomplete forms will be returned to you unprocessed.
\item Forms must be accompanied by the correct fee.
\item There is no appeal. The adjudicators' decision is final.
\end{itemize}
\end{minipage}
```

Please make sure you send in your completed forms by January 1st next year, or the penalty clause 2(a) will apply.

- Incomplete forms will be returned to you unprocessed.

- Forms must be accompanied by the correct fee.

- There is no appeal. The adjudicators' decision is final.

```
\fbox{\begin{tabular}{p{1in}}
Multiline text in a box typeset using \textsf{tabular}
\end{tabular}}
```

Multiline text
in a box typeset
using **tabular**

```
\begin{figure}[ht]
 \setlength{\fboxrule}{3pt}  % make border lines thick
 \setlength{\fboxsep}{.2in}  % increase distance to border of box
 \begin{center} \fbox{ This is a framed figure. }
 \end{center}
 \caption{A Framed Figure with Caption at Bottom \label{youcanlabelthis}}
\end{figure}
```

This is a framed figure.

Figure 33: A Framed Figure with Caption at Bottom

7.5 Indexes and glossaries

LaTeX has a powerful, automated indexing facility which uses the standard *makeindex* program. To use indexing, use the package makeidx and include the **\makeindex** command in your preamble:

```
\usepackage{makeidx}
\makeindex
```

When you want to index something, using the command **\index** followed by the entry in curly braces, as you want it to appear in the index, using one of the following formats:

Plain entry Typing \index{beer} will create an entry for 'beer' with the current page number.

Subindex entry For an entry with a subentry use an exclamation mark to separate them: \index{beer!lite}. Subsubentries also work to another level deep: \index{beer!lite!American}.

Cross-references 'See' entries are done with the vertical bar (one of the rare times it does *not* get interpreted as a math character): \index{Microbrew|see{beer}}

Font changes To change the typographic style of an entry, use the @-sign followed by a font change command: \index{Budweiser@\textit{Budweiser}}. This example indexes 'Budweiser' and italicises it at the same time. Any of the standard \text... font-change commands work here: see §8.2.3 for details. You can also change the font of the index number on its own, as for first-usage references, by using the vertical bar in a similar way to the 'see' entries above, but substituting a font-change command (*without* a backslash) such as textbf for bold-face text: \index{Budweiser|textbf} (see the index).

7.6 Multiple columns

Use the multicol package: the environment is called **multicols** (note the plural form) and it takes the number of columns as a separate argument in curly braces:

```
\usepackage{multicol}
...
\begin{multicols}{3}
...
\end{multicols}
```

`\newcounter{`*name*`}[`*within*`]`

where *name* is the (unique) name of the counter (cannot be the same as one of the intrinsic counter names). The initial value of the counter is 0. For example, `\newcounter{mycounter}` defines a counter whose name is `mycounter`. You can also define the counter to be *within* another counter. For example,

`\newcounter{mycounter}[section]`

defines `mycounter` to be within the section counter. This will cause the value of `mycounter` to be reset to 0 when entering a new section.

The counter values are printed in Arabic numerals, but you can specify the type of numeral, shown in Table 7.

What you see	What you write
a, b, c, d, ...	`\alph{mycounter}`
A, B, C, D, ...	`\Alph{mycounter}`
1, 2, 3, 4, ...	`\arabic{mycounter}`
i, ii, iii, iv, ...	`\roman{mycounter}`
I, II, III, IV, ...	`\Roman{mycounter}`

Table 7: Numerals to Print Counters

`\setcounter{mycounter}{\value{page}}`