## IATEX Command Summary

This listing contains short descriptions of the control sequences that are likely to be handy for users of LATEX v2.09 layered on TEX v2.0. Some of these commands are LATEX macros, while others belong to plain TEX; no attempt to differentiate them is made.

 $\ \ \sqcup$  — ordinary space after period.

- $\begin{array}{l} \mathbf{1} & -\text{negative thin space} = -\frac{1}{6} \text{ quad};\\ \mathbf{xx} \mathbf{1} \text{ x yields } xxx \text{ (math mode)}. \end{array}$
- " makes an umlaut, as ö.
- **\#** prints a pound sign: #.
- $\$  prints a dollar sign: .
- $\$  prints a percent sign: %.
- \& prints an ampersand: &.
- \' in tabbing environment moves current column to the right of the previous column. Elsewhere, acute accent, as ó.
- \( start math mode. Same as \begin{math}
   or \$.
- $\)$  end math mode. Same as  $\end{math}$  or \$.
- \\* is a discretionary multiplication sign, at which a line break is allowed.
- \+ moves left margin to the right by one tab stop. Begin tabbed line.
- \, thin space =  $\frac{1}{6}$  quad; xx\,x yields xxx. It is not restricted to math mode.
- \- in tabbing environment, moves left margin to the left by one tab stop. Elsewhere, optional hyphenation.
- $\backslash.$  puts a dot accent over a letter, as  $\dot{\mathrm{o}}.$
- $\backslash$  inserts italics adjustment space.
- : medium space =  $\frac{2}{9}$  quad; xx: yields xx x (math mode).
- \; thick space =  $\frac{5}{18}$  quad; xx\;x yields xx x (math mode).
- \< in tabbing environment, puts text to left of local left margin.
- \= in tabbing environment, sets a tab stop. Elsewhere, makes a macron accent, as ō.
- **\>** in **tabbing** environment is a forward tab. Otherwise, medium space  $=\frac{2}{9}$  quad (math mode).
- \**0** declares the period that follows is to be a sentence-ending period.
- $\[--same as \begin{displaymath} or $$.$
- $\$ terminates a line.

- \\\* terminates a line, but disallows a pagebreak.
- $\]$  same as  $\end{displaymath}$  or \$\$.
- $\$  makes a circumflex, as ô.
- $\_$  is an underscore, as in *hours\_worked*.
- \' in tabbing environment moves all text which
  follows (up to \\) to the right margin.
  Elsewhere, grave accent , as ò.
- $\figure{1}{1}$  prints a curly left brace: {.
- $\parallel$  is  $\parallel$  (math mode).
- $\}$  prints a curly right brace:  $\}$ .
- \a' makes an acute accent in tabbing environment, as ó.
- \a' makes a grave accent in tabbing environment, as ò.
- \a= makes a macron accent in tabbing environment, as ō.
- \aa is å. \AA is Å.
- **\acute** makes an acute accent:  $\acute{a}$  (math mode).
- \addcontentsline{toc}{section}{name} adds
   the command \contentsline{section}{name}
   to the .toc file.
- **\address{text}** declares the return address in the **letter** document style.
- \addtocontents{toc}{text} writes text to the
  .toc file.
- \addtocounter{name}{amount} adds amount to
   counter name.
- \addtolength{\nl}{length} adds length to length command \nl. See also \setlength, \newlength, \settowidth.
- \ae is æ. \AE is  $\mathcal{E}$ .
- \alph{counter} prints counter as lower-case
   letters. \Alph{counter} prints upper-case
   letters.
- **\alpha** is  $\alpha$  (math mode).
- \amalg is II (math mode).
- \and separates multiple authors for the \maketitle command.
- \angle is  $\angle$  (math mode).
- \appendix starts appendices.
- \approx is  $\approx$  (math mode).
- **\arabic{counter}** prints counter as arabic numerals 1, 2, etc.
- **\arcsin** is arcsin (math mode).

- **\arctan** is arctan (math mode).
- \arg is arg (math mode).

**\arraycolsep** — width of the space between columns in an **array** environment.

\arrayrulewidth — width of the rule created in
tabular or array environment by |, \hline,
or \vline.

\arraystretch — scale factor for interrow
 spacing in array and tabular environments.

ast is \* (math mode).

\asymp is  $\asymp$  (math mode).

\author{names} declares author(s) for the \maketitle command.

\b is a "bar-under" accent, as o.

- $backslash is \setminus (math mode).$
- **\bar** puts a macron over a letter:  $\bar{a}$  (math mode).
- **\baselineskip** distance from bottom of one line of a paragraph to bottom of the next line.
- \baselinestretch factor by which
   \baselineskip is multiplied each time a type
   size changing command is executed.
- \begin{environment} always paired with
   \end{environment}. Following are the assorted
   environments.
- **\begin{abstract}** starts an environment for producing an abstract.
- \begin{array}{lrc} starts array environment with 3 columns, left-justified, right-justified, and centered. Separate columns with &, and end lines with \\. @{text} between 1, r or c arguments puts text between columns.
- **\begin{center}** starts an environment in which every line is centered. End lines with \\.
- \begin{description} starts a labeled list. Items
   are indicated by \item[label].
- \begin{displaymath} sets mathematics on lines
   of its own. Same as \[ or \$\$.

**\begin{document**} starts the actual text of a document. Required.

\begin{enumerate} starts a numbered list.

- \begin{eqnarray} starts a displaymath
   environment in which more than one equation
   can be accommodated. Separate equations with
   \\ or \\\*; use \nonumber to suppress
   numbering a particular equation.
- **\begin{eqnarray\***} begins an environment like the **eqnarray** environment except that the equations aren't numbered.
- \begin{equation} starts a displaymath
   environment and adds an equation number.

- \begin{figure}[pos] begins a floating
   environment, which may be optionally placed
   at pos (see positions on page 8). Document
   styles report and article use the default tbp.
- \begin{figure\*}[pos] begins a
   two-column-wide figure. See \begin{figure}.

\begin{flushleft} starts environment with
 ragged right-hand margin. Separate lines with
 \\. See \raggedright.

- \begin{flushright} starts environment with
   ragged left-hand margin. Separate lines with
   \\. See \raggedleft.
- **\begin{itemize}** starts a "bulleted" (•) list. Start each item with **\item**.
- \begin{list}{labeling}{spacing} starts a
   general list environment. labeling specifies
   how items are labeled when \item has no
   argument. spacing is an optional list of
   spacing parameters.
- \begin{math} starts a math display like this:  $x^2 + y^2$ , within text. Same as \$ or \(.
- \begin{minipage}[pos]{vsize} starts a box of height vsize. Text will be positioned according to pos (see positions on page 8).
- **\begin{picture**} $(x, y)(x_l, y_l)$  starts a picture environment whose width is x units, height is y units, and lower-left corner is the point  $(x_l, y_l)$ . Set units with **\unitlength**.
- **\begin{quotation}** starts an environment with wider margins, normal paragraph indenting, and offset from the text at top and bottom.

\begin{quote} starts an environment with wider
 margins, no paragraph indenting, and offset
 from the text at top and bottom.

\begin{tabbing} starts a columnar environment.
Use commands \= (set tab), \> (tab), \<
 (backtab), \+ (indent one tab stop), \ (outdent one tab stop), \' (flush right), \'
 (flush left), \pushtabs, \poptabs, \kill, \\.</pre>

\begin{table}[pos] begins a floating
 environment, which may be optionally placed
 at pos (see positions on page 8). Document
 styles report and article use the default tbp.

- \begin{table\*}[pos] begins a two-column-wide
   table. See \begin{table}.
- \begin{tabular}{arg} starts an array
  environment which can be used in or out of
  math mode. arg contains column text
  positioning commands r, 1, c, @{...},
  p{length} (see positions on page 8).
  | produces vertical line between columns.
  \*{7}{r|1|} repeats that entry 7 times.

 $\begin{theorem} - see \newtheorem.$ 

**\begin{titlepage}** is an environment with no page number, and causes following page to be numbered "1".

\begin{verbatim} starts an environment which
will be typeset exactly as you type it, carriage
returns and all, usually in typewriter font.

\begin{verse} starts an environment for poetry
with wider margins, no paragraph indenting,
and ragged right margin.

\beta is  $\beta$  (math mode).

\bf switches to **bold face** type.

\bibitem{ref} text creates a bibliography entry
text, numbers it, and labels it with reference
label ref.

\bibliography{file} — insert bibliography
from file name.bib at this point in text.

\bibliographystyle{style} — a format
specifier, like \documentstyle.

\bigcap is  $\bigcap$  (math mode).

**\bigcirc** is  $\bigcirc$  (math mode).

\bigcup is  $\bigcup$  (math mode).

\bigodot is  $\bigcirc$  (math mode).

\bigoplus is  $\bigoplus$  (math mode).

\bigotimes is  $\bigotimes$  (math mode).

\bigtriangledown is  $\bigtriangledown$  (math mode).

\bigtriangleup is  $\triangle$  (math mode).

\bigskip — standard "big" vertical skip.

\bigskipamount — default length for \bigskip.

 $\bigsqcup is [] (math mode).$ 

\biguplus is  $\biguplus$  (math mode).

\bigvee is  $\bigvee$  (math mode).

\bigwedge is  $\bigwedge$  (math mode).

**\bmod** is binary modulo expression  $u \mod m$  (math mode).

**\boldmath** changes math italics and math symbols to boldface. Should be used *outside* of math mode.

\bot is  $\perp$  (math mode).

**\bottomfraction** — maximum fraction of page occupied by floats at the bottom.

**\bowtie** is  $\bowtie$  (math mode).

**\Box** is  $\Box$  (math mode).

**\breve** makes a breve accent:  $\breve{a}$  (math mode).

**\bullet** is  $\bullet$  (math mode).

\c is a cedilla, as ç.

**\cal** produces calligraphic letters, as  $\mathcal{B}$  (math mode).

- \cap is  $\cap$  (math mode).
- \caption[loftitle] {text} creates a numbered caption in a figure or table environment. Optional loftitle contains entry for the list of figures if different from text.
- \cc{text} declares list of copy recipients for
   letter document style.

**\cdot** is  $\cdot$  (math mode).

\cdots makes three dots centered on the line: ... (cf. \ldots) (math mode).

\centering declares that all text following is to be centered (cf. \begin{center}).

- \chapter[toctitle]{text} begins a new
  section, automatically headed and numbered.
  Optional toctitle contains entry for the table
  of contents if different from text.
- \chapter\*{title} is like \chapter{title}, but
   adds no chapter number or table of contents
   entry.

**\check** makes a háček, as  $\check{a}$  (math mode).

\chi is  $\chi$  (math mode).

\circ is  $\circ$  (math mode).

- \circle{diameter} as a valid argument for \put
   in a picture environment, draws a circle.
- \circle\*{diameter} is like \circle, but draws
   a solid circle.
- \cite[subcit]{ref} produces a reference, in
   square brackets, to a bibliographic item created
   with \bibitem{ref}. Optional sub-citation
   subcit can be inserted in the entry.
- **\cleardoublepage** forces next page to be a right-hand, odd-numbered page.

\clearpage ends a page where it is, and puts pending figures or tables on separate float pages with no text.

\cline{i-j} draws a horizontal line across
 columns i through j inclusive in array or
 tabular environments.

\closing{text} declares the closing in letter
 document style.

\clubsuit is  $\clubsuit$  (math mode).

- \columnsep distance between columns in
  two-column text.
- \columnseprule width of the rule between
   columns on two-column pages.
- \columnwidth width of the current column.
  Equals \textwidth in single-column text.

\cong is  $\cong$  (math mode).

\coprod is  $\coprod$  (math mode).

 $\operatorname{copyright}$  is  $\bigcirc$ .

 $\cos is \cos (math mode).$ 

 $\cosh$  is cosh (math mode).

 $\cot is \cot (math mode).$ 

\coth is coth (math mode).

 $\csc$  is csc (math mode).

\cup is  $\cup$  (math mode).

\dashbox{dwid}(width,height)[pos]{text}
 creates a dashed rectangle around text in a
 picture environment. Dashes are dwid units
 wide; dimensions of rectangle are width and
 height; text is positioned at optional pos (see
 positions on page 8).

**\dashv** is  $\dashv$  (math mode).

\date{adate} declares the date for the
 \maketitle command. The default is \today.

day — current day of the month.

\dblfloatpagefraction — minimum fraction of a float page that must be occupied by floats, for two-column float pages.

\dblfloatsep — distance between floats at the top or bottom of a two-column float page.

\dbltextfloatsep — distance between double-width floats at the top or bottom of a two-column page and the text on that page.

\dbltopfraction — maximum fraction at the top of a two-column page that may be occupied by floats.

\ddag is ‡.

**\ddot** makes a dieresis over a letter:  $\ddot{a}$  (math mode).

\ddots produces a diagonal ellipsis  $\cdots$  (math mode).

\deg is deg (math mode).

\delta is  $\delta$ . \Delta is  $\Delta$  (math mode).

\det is det (math mode).

\diamond is  $\diamond$ . \Diamond is  $\diamond$  (both math mode).

\diamondsuit is  $\diamondsuit$  (math mode).

\dim is dim (math mode).

\displaystyle switches to displaymath or equation environment typesetting (math mode).

 $\det v$  is  $\div$  (math mode).

\documentstyle[substy]{sty} determines
 default font, headings, etc., for document of
 style sty (and optional substyle substy).
 Styles: article, book, letter, report,
 slides. Substyles: 11pt, 12pt, acm, draft,
 fleqn, leqno, twocolumn, twoside.

\dot makes a dot over a letter:  $\dot{a}$  (math mode).

\doteq is  $\doteq$  (math mode).

**\dotfill** expands to fill horizontal space with row of dots.

\doublerulesep — horizontal distance between
vertical rules created by || in tabular or
array environment.

\downarrow is  $\downarrow$ . \Downarrow is  $\Downarrow$  (math mode).

\ell is  $\ell$  (math mode).

**\em** toggles between roman and *italic* fonts for *emphasis*.

**\emptyset** is  $\emptyset$  (math mode).

\encl{text} declares a list of enclosures for
 letter document style.

\end{environment} ends an environment begun
by \begin{environment} (q.v.).

**\epsilon** is  $\epsilon$  (math mode).

\equiv is  $\equiv$  (math mode).

\eta is  $\eta$  (math mode).

**\evensidemargin** — distance between left side of page and text's normal left margin, for even-numbered pages in two-sided printing.

**\exists** is  $\exists$  (math mode).

 $\exp$  is exp (math mode).

\fbox{text} makes a framed box around text.

\fboxrule — thickness of ruled frame for \fbox and \framebox.

\fboxsep — space between frame and text for \fbox and \framebox.

\fill — rubber length (glue) that can stretch to arbitrary length. Usually used to justify text a particular way.

\flat is  $\flat$  (math mode).

\floatpagefraction — minimum fraction of a float page occupied by floats.

\floatsep — distance between floats that appear at the top or bottom of a text page.

\flushbottom causes pages to be stretched to
 \textheight.

\fnsymbol{counter} prints counter as one of the set of "footnote symbols". counter must be less than 10.

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- **\footheight** height of box at bottom of page that holds page number.
- \footnote{text} creates a footnote of text.
- **\footnotemark** puts a footnote number into the text.
- **\footnotesep** height of strut placed at beginning of footnote.
- \footnotesize switches to footnote-sized type.
- **\footskip** vertical distance between bottom of last line of text and bottom of page footing.
- \footnotetext{text} specifies the text for a
  footnote which was indicated by a
  \footnotemark.
- \forall is  $\forall$  (math mode).
- \frac{numerator}{denominator} produces a fraction in math environments.
- \frame{text} makes a framed (outlined) box
  around text, with no margin between the text
  and the frame.
- \framebox[size] [pos] {text} produces a
   framed box of dimension size containing
   text, optionally positioned 1 or r.
   In picture environment,
  - \framebox(width,height)[pos]{text} creates a rectangle around text; dimensions of rectangle are width and height; text is positioned at optional pos (see positions on page 8).
- \frown is  $\frown$  (math mode).
- \fussy is the default declaration for the line-breaking algorithm (cf. \sloppy).
- \gamma is  $\gamma$ . \Gamma is  $\Gamma$  (math mode).
- \gcd is gcd (math mode).
- \ge is  $\geq$  (math mode).
- \geq is  $\geq$  (math mode).
- \gets is  $\leftarrow$  (math mode).
- \gg is  $\gg$  (math mode).
- \glossary{text} appends text to the .glo file
   by writing a \glossaryentry command.
- \glossaryentry{text}{ref} is written to the
  .glo file for \glossary{text} occurring at
  reference ref.
- **\grave** makes a grave accent:  $\dot{a}$  (math mode).
- \H prints a long Hungarian umlaut, as ő.
- \hat makes a circumflex:  $\hat{a}$  (math mode).
- **\hbar** is  $\hbar$  (math mode).
- \headheight height of box at top of page that
  holds running head.

- **headsep** vertical distance between bottom of head and top of text.
- **\heartsuit** is  $\heartsuit$  (math mode).
- **\hline** draws a horizontal line across all columns of a **tabular** or **array** environment.
- **\hookleftarrow** is  $\leftarrow$  (math mode).
- **\hookrightarrow** is  $\hookrightarrow$  (math mode).
- **\hrulefill** expands to fill horizontal space with horizontal rule.
- **\hspace{len}** leaves a horizontal space of dimension len.
- \hspace\*{len} is like \hspace{len} but space is
  not removed at the beginning or end of a line.
- **\huge** switches to a very large typeface. **\Huge** is even bigger.

\hyphenation{wordlist} declares hyphenation
 as indicated; wordlist contains words
 separated by spaces, with hyphens indicated
 (e.g. "aard-vark cal-i-bra-tion").

- \i is 1.
- $\texttt{iff is} \iff (\text{math mode}).$
- $Im is \Im (math mode).$
- \imath is i (math mode).
- \in is  $\in$  (math mode).
- \include{filename} brings in filename text at
  that point.
- \includeonly{file1,file2,...} limits
  recognition of \include files.
- \index{text} appends text to the .idx file by
  writing an \indexentry command.
- \indexentry{text}{ref} is written to the .idx
  file for \index{text} occurring at reference
  ref.
- **\indexspace** puts blank space before first index entry starting with a new letter.
- $\inf$  is inf (math mode).
- \infty is  $\infty$  (math mode).
- \input{file} brings in text from file.tex at
  that point.
- \int is  $\int$  (math mode).
- \intextsep vertical space placed above and below float in middle of text.
- \iota is  $\iota$  (math mode).
- \it switches to *Italic* type.
- \item[text] indicates a list entry. text is
   optional, used in description environment.

- \itemindent extra indentation before label in list item. Default is Omm.
- \itemsep vertical space between successive list
  items.

∖j is j.

- \jmath is j (math mode).
- \Join is  $\bowtie$  (math mode).
- \kappa is  $\kappa$  (math mode).
- $\ ker is ker (math mode).$
- \kill in a \tabbing environment, deletes
   previous line so tabs can be set without
   outputting text.
- 1 is l. L is L.
- \label{text} provides a reference point that is
   accessed with \ref{text} or \pageref{text}.
- **\labelwidth** width of box containing list item label.
- **\labelsep** space between box containing list item label and text of the item.
- \lambda is  $\lambda$ . \Lambda is  $\Lambda$  (math mode).
- \land is  $\wedge$  (math mode).
- \langle is  $\langle$  (math mode).
- \large, \Large, and \LARGE switch to
   successively larger than \normalsize type
   sizes.
- \LaTeX produces the LATEX logo.
- \lbrace is { (math mode).
- \lbrack is [ (math mode).
- \ldots makes three dots at the base of the line: ...(cf. \cdots).
- \le is  $\leq$  (math mode).
- **\leadsto** is  $\rightsquigarrow$  (math mode).
- \left\* (where \* is a delimiter) must be paired
  with \right\* (not necessarily using the same
  delimiter). '.' acts as a null delimiter (math
  mode).
- **\leftarrow** is  $\leftarrow$ . **\Leftarrow** is  $\Leftarrow$  (math mode).
- \lefteqn{formula} is used in the eqnarray
  environment to break a long formula across
  lines.
- $\label{eq:leftharpoondown} \$  is  $\leftarrow$  (math mode).
- $\label{eq:leftharpoonup} \$  is  $\leftarrow$  (math mode).
- \leftmargin, in list environment, horizontal
  distance between left margin of enclosing
  environment and left margin of list. Settable
  for nesting levels 1 through 6, as \leftmargini
  through \leftmarginvi.

- $\label{eq:leftrightarrow} \$  (math mode).
- \leq is  $\leq$  (math mode).
- **\lfloor** is  $\lfloor$  (math mode).
- \lhd is  $\triangleleft$  (math mode).
- \lim is lim (math mode).
- \liminf is liminf (math mode).
- \limsup is lim sup (math mode).
- \line(x,y){len} in picture environment, in
   \put command, draws line from \put argument
   with length len and slope (x,y).
- \linebreak[n] forces a line to break exactly at
  this point, and adjusts line just terminated (cf.
  newline). n is optional: 0 is an optional break,
  4 is a mandatory break, 1, 2 and 3 are
  intermediate levels of insistence.
- \linethickness{dimen} sets the thickness for all
  lines in a picture.
- **\linewidth** is the width of the current line in a paragraph.
- **\listoffigures** begins a list of figures with heading.
- **\listoftables** begins a list of tables with heading.
- **\listparindent** extra indentation added to first line of every paragraph of an item after the first, in **list** environment.
- \ll is  $\ll$  (math mode).
- $\ln is \ln (math mode).$
- \lnot is  $\neg$  (math mode).
- $\log is \log (math mode).$
- $\label{eq:longleftarrow} \$  (math mode).
- $\verb+longleftrightarrow is \longleftarrow.$
- $\Longleftrightarrow$  is  $\iff$  (math mode).  $\longmapsto$  is  $\longmapsto$  (math mode).
- $\label{eq:longrightarrow} \$  .  $\$  (math mode).

lq is a left-quote: '.

- \makebox[size][pos]{text} creates a box of dimension size containing text at optional pos. \makebox(width,height)[pos]{text} puts text in a box; dimensions of box are width and height; text is positioned at optional pos (see positions on page 8).
- \makeglossary enables writing of
   \glossaryentry commands to a .glo file.

<sup>\</sup>lor is  $\lor$  (math mode).

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\makeindex enables writing of \indexentry
  commands to a .idx file.
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\maketitle produces a title with \title, \author, and, optionally, \date.

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mapsto is \mapsto (math mode).
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\marginpar{text} puts text in the margin as a
note.

\marginparpush — minimum amount of vertical
space between two marginal notes.

\marginparsep — horizontal space between
margin and marginal note.

**\marginparwidth** — width of a marginal note.

\markboth{lhd}{rhd} defines the left-hand heading lhd and the right-hand heading rhd for the headings and myheadings page styles.

\markright{rhd} defines the right-hand heading
 rhd for the headings and myheadings page
 styles.

 $\max$  is max (math mode).

\mbox{text} places text into a horizontal box.

 $\verb+medskip-standard "medium" vertical skip.$ 

\medskipamount — default length for \medskip.

\mho is  $\mho$  (math mode).

 $\$  (math mode).

\min is min (math mode).

\mit is "math italic" as in  $\Pi$  (math mode).

\models is  $\models$  (math mode).

\month — current month of the year.

\mp is  $\mp$  (math mode).

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\mu is \mu (math mode).
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\multicolumn{noc}{fmt}{text} in tabular
environment puts text across noc columns
using positioning format fmt (c, r, 1, and/or |).

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\operatorname{\mathsf{hultiput}}(x, y) (\Delta x, \Delta y) \{n\} \{obj\}  is
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 $\operatorname{vut}(x, y) \{ \operatorname{obj} \}$ 

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\operatorname{vut}(x + \Delta x, y + \Delta y) \{ \operatorname{obj} \}
```

```
. . .
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 $\operatorname{\mathsf{Vput}}(x+(n-1)\Delta x,y+(n-1)\Delta y) \{\operatorname{\mathsf{obj}}\}.$ 

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\nabla is \nabla (math mode).
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**\natural** is  $\natural$  (math mode).

\ne is  $\neq$  (math mode).

**\nearrow** is  $\nearrow$  (math mode).

\neg is  $\neg$  (math mode).

\neq is  $\neq$  (math mode).

\newcommand{\cs}[narg]{def} defines a new control sequence \cs with definition def. Optionally, narg is the number of arguments, indicated in def as #1, #2, etc.

- \newcounter{counter}[name] defines a counter
   optionally to be zeroed whenever the name
   counter is incremented.
- \newenvironment{envname}[narg]{def1}{def2}
  defines a new environment, optionally with
  some number of arguments narg. def1 is
  executed when the environment in entered and
  def2 is executed when it is exited.
- \newfont{cs}{name} defines a control sequence
   \cs that chooses the font name.
- \newlength{\nl} sets up \nl as a length of Oin.
  See also \setlength, \addtolength,
   \settowidth.
- **\newline** breaks a line right where it is, with no stretching of terminated line (cf. **\linebreak**).
- \newsavebox{\binname} declares a new bin to
  hold a \savebox.

\newtheorem{env}[env2]{label}[sectyp]
defines a new theorem environment env
 (optionally with the same numbering scheme as
 environment env2) with labels label.
 Optionally, theorem numbers can be related to
 document section sectyp.

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\ni is \ni (math mode).
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- \nofiles suppresses writing of auxiliary files
  .idx, .toc, etc.
- \noindent suppresses indentation of first line of
   paragraph.
- \nolinebreak[n] prevents a line break at that
  point (cf. \linebreak on page 6).
- **\nonumber** is used in an **eqnarray** environment to suppress equation numbering.
- \nopagebreak[n] prevents a page break at that
   point (cf. \linebreak on page 6).

\normalmarginpar is default declaration for
 placement of marginal notes (cf.
 \reversemarginpar).

- **\normalsize** is the default type size for the document.
- **\not** puts a slash through a relational operator: **\not=** is  $\neq$  (math mode).
- **\notin** is  $\notin$  (math mode).

\nu is  $\nu$  (math mode).

\nwarrow is  $\leq$  (math mode).

\o is  $\emptyset$ . \O is  $\emptyset$ .

**\obeycr** makes embedded carriage returns act like line terminators.

- **\oddsidemargin** distance between left side of page and text's normal left margin.
- **\odot** is  $\odot$  (math mode).
- \oe is  $\infty$ . \OE is  $\times$ .
- \oint is  $\oint$  (math mode).
- \omega is  $\omega$ . \Omega is  $\Omega$  (math mode).
- $\verb|minus is \ominus (math mode)|.$
- \onecolumn sets text in single column (default)
   (cf. \twocolumn.
- **\opening{text}** declares an opening for **letter** document style.
- **\oplus** is  $\oplus$  (math mode).
- **\oslash** is  $\oslash$  (math mode).
- **\otimes** is  $\otimes$  (math mode).

\oval(x,y) as an argument to \put draws an
 oval x units wide and y units high.

 $\text{verbrace{text}}$  gives  $\widehat{text}$  (math mode).

 $\operatorname{verline{text}}$  gives  $\overline{text}$  (math mode).

\owns is  $\ni$  (math mode).

 $P is \P$ .

- \pagebreak[n] forces a page break at that point
   (cf. \linebreak on page 6).
- \pagenumbering{style} determines page number style; style may be arabic (3), roman (iii), Roman (III), alph (c), Alph (C).

\pageref{text} is the page number on which
 \label{text} occurs.

\pagestyle{sty} determines characteristics of a
 page's head and foot. sty may be plain (page
 number only), empty (no page number),
 headings (running headings on each page),
 myheadings (user headings).

\paragraph[toctitle]{text} begins a new
paragraph, automatically headed and
numbered. Optional toctitle contains entry
for the table of contents if different from text.

\paragraph\*{text} begins a paragraph and prints a title, but doesn't include a number or make a table of contents entry.

**\parallel** is  $\parallel$  (math mode).

\parbox[pos]{size}{text} is a box created in paragraph mode. text is positioned optionally at pos (see positions on page 8). Width is size.

\parindent — horizontal indentation added at beginning of paragraph.

\parsep — extra vertical space between
paragraphs within a list item.

**\parskip** — extra vertical space between paragraphs, normally.

- \part[toctitle]{text} begins a new part, automatically headed and numbered. Optional toctitle contains entry for the table of contents if different from text.
- \part\*{text} begins a part and prints a title, but doesn't include a number or make a table of contents entry.

\partial is  $\partial$  (math mode).

\partopsep — extra vertical space added before first list item if environment starts a new paragraph.

\perp is  $\perp$  (math mode).

- \phi is  $\phi$ . \Phi is  $\Phi$  (math mode).
- \pi is  $\pi$ . \Pi is  $\Pi$  (math mode).

\pm is  $\pm$  (math mode).

- $\label{eq:mod_modulus} is "parenthesized" modulo expression u \pmod{2^{e_j}-1} \pmod{2^{e_j}-1}$
- \poptabs undoes the previous \pushtabs
  command (restore prior tab settings).
- positions, for boxing commands: t=top, b=bottom, h=here, l=left, c=center, r=right, p=new page (figure environment), p=parbox (tabular environment).
- \pounds is  $\pounds$ .
- $\Pr$  is  $\Pr$  (math mode).
- \prec is  $\prec$  (math mode).
- \preceq is  $\leq$  (math mode).
- \prime is / (math mode).
- \prod is  $\prod$  (math mode).

\propto is  $\propto$  (math mode).

\protect permits the use of "dangerous" commands in @-expressions, or in sectioning command and \caption arguments.

\ps in letter document style permits additional text after \closing.

\psi is  $\psi$ . \Psi is  $\Psi$  (math mode).

\pushtabs in tabbing environment lets you stack tab stop definitions. Undo with \poptabs.

\put(x,y){stuff} is the basic picture-drawing command. (x,y) is the reference point, whose meaning varies for different stuff. stuff may be anything that goes in an \mbox.

\raggedbottom causes pages to assume natural height.

\raggedleft declares all text that follows is to be
flush against the right margin (cf.
 \begin{flushright}).

- \raggedright declares all text that follows is to
   be flush against the left margin (cf.
   \begin{flushleft}).
- \raisebox{dim}[d2][d3]{text} moves text up
  by dim (which may be negative). Optional d2
  makes system think that text extends d2 above
  the baseline (and optionally d3 below it).

**\rangle** is  $\rangle$  (math mode).

rbrace is  $\}$  (math mode).

\rbrack is ] (math mode).

\Re is  $\Re$  (math mode).

- \ref{text} is the section number in which
   \label{text} occurs.
- \renewcommand{\cs}[narg]{def} redefines an
   existing control sequence \cs with definition
   def. Optionally, narg is the number of
   arguments, indicated in def as #1, #2, etc.
- \renewenvironment{envname}[narg]{def1}{def2}
  redefines an existing environment. See
  \newenvironment.
- \restorecr undoes the \obeycr command (makes carriage return a space-producing character).
- \reversemarginpar causes opposite margin to be used for marginal notes (e.g., left margin on odd-numbered pages).

\rhd is  $\triangleright$  (math mode).

**\rho** is  $\rho$  (math mode).

- \right\* (where \* is a delimiter) must be paired
  with \left\* (not necessarily using the same
  delimiter). '.' acts as a null delimiter (math
  mode).
- $\$  (math mode).
- $\ ightharpoonup is \rightarrow (math mode).$
- $\times is \rightleftharpoons (math mode).$

\rightmargin — in list environment, horizontal
 distance between right margin of enclosing
 environment and right margin of list. Default
 Oin.

\rm switches to Roman type.

\roman{counter} prints counter in lower-case roman numerals. \Roman{counter} prints upper-case roman numerals.

rq is a right-quote: '.

\rule[height] {length} {width} makes a
rectangular blob of ink length long, width
wide, with optional height above baseline.
\S is §.

\savebox{\binname}[width][pos]{text} is
 exactly like \makebox (q.v.), but saves box
 definition in bin \binname. Access with
 \usebox{\binname}.

\sbox{\binname}{text} saves text in box
\binname (see \savebox, above).

 $\sc switches to caps and small caps font.$ 

- \scriptsize switches subscript size type.
- \scriptstyle switches to sub- or superscript-sized typesetting. \scriptscriptstyle switches to second-level (very small) sub- or superscript-sized typesetting (math mode).

\searrow is  $\searrow$  (math mode).

\sec is sec (math mode).

- \section[toctitle]{text} begins a new
  section, automatically headed and numbered.
  Optional toctitle contains entry for the table
  of contents if different from text.
- \section\*{text} begins a section, prints a title, but doesn't include a number or make a table of contents entry.
- \setcounter{counter}{value} resets the value
   of counter.

\setlength{\nl}{length} sets value of length
 command \nl to length. See also
 \addtolength, \newlength, \settowidth.

\setminus is  $\setminus$  (math mode).

\settowidth{\nl}{text} sets value of length
 command \nl to the width of text. See also
 \setlength, \newlength, \addtolength.

\sf switches to sans serif font.

\sharp is  $\sharp$  (math mode).

\shortstack[pos]{x\\yy\\zzz} yields zzz, a
one-column tabular arrangement of its
arguments. Optional pos can be 1 or r for text
position.

x

- \sigma is  $\sigma$ . \Sigma is  $\Sigma$  (math mode).
- \signature{text} declares a signature for
  letter document style.

\sim is ~ (math mode).

- \simeq is  $\simeq$  (math mode).
- $\sin is sin (math mode).$

<sup>\</sup>sinh is sinh (math mode).

- \sl switches to *slanted* typeface.
- \sloppy relaxes the line-breaking algorithm to allow more or less distance between words. Default is \fussy.
- \small switches to smaller than normalsize typeface.
- \smallint is  $\int$  (math mode).
- \smallskip standard "small" vertical skip.
- \smallskipamount default length for
   \smallskip.
- \smile is  $\smile$  (math mode).
- \spadesuit is  $\blacklozenge$  (math mode).
- $\space{1.5}$  \sqcap is  $\sqcap$  (math mode).
- $sqcup is \sqcup (math mode).$
- $sqrt[3]{arg}$  is  $\sqrt[3]{arg}$ . 3 (root) is optional.
- \sqsubset is  $\sqsubset$  (math mode).
- \sqsubseteq is  $\sqsubseteq$  (math mode).
- \sqsupset is  $\Box$  (math mode).
- \sqsupseteq is  $\supseteq$  (math mode).
- ∖ss is ß.
- $\stackrel{stuff}{delim}$  puts stuff above the delimiter;  $\stackrel{f}{\longrightarrow}$  yields  $\xrightarrow{f}$  (math mode).
- \star is  $\star$  (math mode).
- \stop type this if T<sub>E</sub>X stops with a \* and no error message.
- \subparagraph[toctitle]{text} begins a subparagraphs, automatically headed and numbered. Optional toctitle contains entry for the table of contents if different from text.
- \subparagraph\*{text} begins a subparagraph
   and prints a title, but doesn't include a number
   or make a table of contents entry.
- \subsection[toctitle]{text},
   \subsubsection[toctitle]{text} begin new
   subsections, automatically headed and
   numbered. Optional toctitle contains entry
   for the table of contents if different from text.
- \subsection\*{text}, \subsubsection\*{text}
  begin subsections, but suppress section number
  and table of contents entry.
- \subset is  $\subset$  (math mode).
- \subseteq is  $\subseteq$  (math mode).
- \succ is  $\succ$  (math mode).
- \succeq is  $\succeq$  (math mode).
- \sum is  $\sum$  (math mode).
- \sup is sup (math mode).
- \supset is  $\supset$  (math mode).

- \supseteq is  $\supseteq$  (math mode).
- \surd is  $\sqrt{(\text{math mode})}$ .
- \swarrow is  $\swarrow$  (math mode).
- \symbol{cc} produces the symbol (glyph)
  character code cc in the current font.
- \t prints a "tie-after" accent, as oo.
- \tabbingsep distance to left of a tab stop
  moved by \'.
- **\tabcolsep** half the width of the space between columns in **tabular** environment.
- **\tableofcontents** produces a table of contents. A .toc file must have been generated during a previous IATEX run.
- \tan is tan (math mode).
- \tanh is tanh (math mode).
- \tau is  $\tau$  (math mode).
- **\TeX** produces the  $T_EX$  logo.
- **\textfloatsep** distance between floats at the top or bottom of a single-column page and the text on that page.
- \textfraction minimum fraction of a text page that must contain text.
- **\textheight** is the normal vertical dimension of the body of the page.
- \textstyle switches to math environment
  typesetting (math mode).
- **\textwidth** is the normal horizontal dimension of the body of the page.
- \thanks{footnote} adds an acknowledgement
  footnote to an author's name used in a
  \maketitle command.
- \theta is  $\theta$ . \Theta is  $\Theta$  (math mode).
- \thicklines is an alternate line thickness for lines in a picture environment. See also linethickness.
- \thinlines is the default declaration for line
   thicknesses in a picture environment. See
   \thicklines.
- **\thinspace** is the proper space between single and double quotes, as in '".
- **\thispagestyle{sty}** determines characteristics of head and foot for the current page only. Used to override **\pagestyle** (q.v.) temporarily.
- **\tilde** makes a tilde, as:  $\tilde{a}$  (math mode).
- \times is  $\times$  (math mode).
- \tiny switches to a very small typeface.
- \title{text} declares a document title for the
   \maketitle command.
- \to is  $\rightarrow$  (math mode).

**\today** generates today's date.

\top is  $\top$  (math mode).

- **\topfraction** maximum fraction at the top of a single-column page that may be occupied by floats.
- \topmargin space between top of T<sub>E</sub>X page (1
  inch from top of paper) and top of header.
- **\topsep** extra vertical space added before first list item and after last list item.
- \topskip minimum distance between top of
   page body to bottom of first line of text.
- \triangle is  $\triangle$  (math mode).
- $\$  (math mode).
- $\forall triangleright is \triangleright (math mode).$
- **\tt** switches to **typewriter** type.
- \twocolumn[text] declares a two-column page,
   with optional full-page width heading text.
- \typein[\cs] {text} displays text on the screen
  and waits for you to enter stuff which will be
  put in the document at that point. Optional
  control sequence \cs can be assigned the value
  of your input, to be used later.
- \typeout{text} displays text on the screen and writes it to the .lis file.
- \u prints a breve accent, as ŏ.
- \unboldmath unemboldens math italics and math symbols. Should be used *outside* of math mode.
- \underbrace{text} gives text (math mode).
- \underline{text} gives text (math mode or not).
- \unitlength length of coordinate units for picture environment.
- \unlhd is  $\trianglelefteq$  (math mode).
- \unrhd is  $\succeq$  (math mode).
- \uparrow is  $\uparrow$ . \Uparrow is  $\uparrow$  (math mode).
- \updownarrow is  $\uparrow$ . \Updownarrow is  $\uparrow$  (math mode).
- \uplus is  $\uplus$  (math mode).
- \upsilon is v. \Upsilon is  $\Upsilon$  (math mode).
- \usebox{\binname} recalls box definition saved
   in box \binname.
- \usecounter{counter} is used in a list
  environment to cause counter to be used to
  number the items.
- v prints a háček, as ŏ.
- \value{counter} produces the numeric value of
   counter.
- **\varepsilon** is  $\varepsilon$  (math mode).

- **\varphi** is  $\varphi$  (math mode).
- **\varpi** is  $\varpi$  (math mode).
- **\varrho** is  $\rho$  (math mode).
- **\varsigma** is  $\varsigma$  (math mode).
- **\vartheta** is  $\vartheta$  (math mode).
- $\texttt{Vdash} \text{ is } \vdash (\text{math mode}).$
- \vdots is : (math mode).
- **\vec** puts a vector over a letter:  $\vec{a}$  (math mode).
- \vector(x,y){len} in picture environment, in
   \put command, draws vector from \put
   argument with length len and slope (x,y),
   with arrowhead.
- \vee is  $\lor$  (math mode).
- \verb/text/ creates a local verbatim
   environment for text, printed in typewriter
   font. Note that text is not in curly braces; it is
   between two identical delimiters, neither of
   which appears in text.
- $\text/$  is like  $\text/$ , but spaces print out as  $\_$ .
- \vert is |. \Vert is || (math mode).
- \vfill is \vspace{\fill} (cf. \fill).
- \vspace{len} leaves a vertical space of
   dimension len.
- \vspace\*{len} is like \vspace{len} but space is
  not removed at the beginning or end of a page.
- \wedge is  $\land$  (math mode).
- $\quad \text{widehat} \{ \arg \} \text{ is } \widehat{arg} \text{ (math mode)}.$
- $\times arg$  is  $\widetilde{arg}$  (math mode).
- \wp is  $\wp$  (math mode).
- \wr is  $\wr$  (math mode).
- \xi is  $\xi$ . \Xi is  $\Xi$  (math mode).
- \year current year (A.D.).
- \zeta is  $\zeta$  (math mode).

## IAT<sub>E</sub>X typefaces

\rm	Roman	Miscellaneous symbols					
\it	Italic						
\bf	Boldface						
\sl	Slanted	†	\dag	§	\S	C	$\copyright$
∖sf	Sans serif	‡	\ddag	¶	\Ρ	£	\pounds
\sc	Small Caps						

\tt Typewriter

## Dimensions or lengths

pt point	(72.27  pt/s)	in)
----------	---------------	-----

- pc pica (12 pt/pc)
- in inch
- bp big point (72 bp/in)
- cm centimeter (2.54 cm/in)
- mm millimeter (10 mm/cm)
- dd didôt point (1157 dd = 1238 pt)
- cc cicero (12 dd/cc)
- sp scaled point (65536 sp/pt)
  em font-dependent; "quad" width
  ex font-dependent; "x"-height

## IATEX environments

abstract	figure	quote
array	flushleft	tabbing
center	flushright	table
description	itemize	tabular
displaymath	list	theorem
enumerate	math	titlepage
eqnarray	$\operatorname{minipage}$	verbatim
equation	picture	verse
	quotation	

#### **Text-mode accents**

ò	\'{o}	ō	\={o}	Ô	\t{oo}
ó	\'{o}	ò	\.{o}	Q	\c{o}
ô	\^{o}	ŏ	\u{o}	ò	\d{o}
ö	\"{o}	ŏ	\v{o}	Q	\b{o}
õ	\~{o}	ő	\H{o}		

#### National symbols

œ	\oe	å	\aa	ł	\1
Œ	\0E	Å	\AA	Ł	\L
æ	\ae	Ø	<b>\</b> 0	ß	\ss
Æ	\AE	Ø	\0		

#### Math-mode accents

$\hat{a}$	$hat{a}$	$\dot{a}$	$\det{a}$
ă	$\check{a}$	$\ddot{a}$	\ddot{a}
$\tilde{a}$	\tilde{a}	$\breve{a}$	\breve{a}
á	$acute{a}$	$\bar{a}$	\bar{a}
à	\grave{a}	$\vec{a}$	\vec{a}

#### Greek letters (math mode)

$\alpha$	\alpha	$\nu$	\nu
$\beta$	\beta	ξ	\xi
$\gamma$	\gamma	0	0
$\delta$	\delta	$\pi$	\pi
$\epsilon$	\epsilon	$\rho$	\rho
ζ	\zeta	$\sigma$	∖sigma
$\eta$	\eta	au	\tau
$\theta$	\theta	v	\upsilon
ι	\iota	$\phi$	\phi
$\kappa$	\kappa	$\chi$	\chi
$\lambda$	\lambda	$\psi$	\psi
$\mu$	\mu	ω	\omega
ε	\varepsilon	ς	\varsigma
$\vartheta$	\vartheta	$\varphi$	\varphi
ρ	\varrho		-
Г	\Gamma	$\Sigma$	\Sigma
Δ	\Delta	Ϋ́	\Upsilon
Θ	\Theta	Φ	\Phi
Λ	\Lambda	$\Psi$	\Psi
Ξ	\Xi	Ω	\Omega
П	\Pi		0

## Binary operations (math mode)

$\pm$	\pm	$\cap$	\cap
Ŧ	\mp	$\cup$	\cup
$\setminus$	\setminus	$ \exists \exists$	\uplus
•	\cdot	Π	\sqcap
×	\times	$\Box$	\sqcup
*	\ast	$\triangleleft$	\triangleleft
*	\star	$\triangleright$	\triangleright
$\diamond$	\diamond	2	\wr
0	\circ	$\bigcirc$	\bigcirc
•	\bullet	$\bigtriangleup$	\bigtriangleup
÷	\div	$\bigtriangledown$	\bigtriangledown
$\triangleleft$	<b>\lhd</b>	$\triangleright$	\rhd
$\vee$	\vee	$\odot$	\odot
$\wedge$	\wedge	†	\dagger
$\oplus$	\oplus	‡	\ddagger
$\ominus$	∖ominus	Ш	\amalg
$\otimes$	\otimes	⊴	\unlhd
$\oslash$	∖oslash	$\triangleright$	\unrhd

#### Variable-sized symbols (math mode)



## Delimiters (math mode)

(	(	)	)
[	[	j	]
{	\{	}	\}
L	\lfloor		\rfloor
Γ	\lceil	1	\rceil
<	\langle	$\rangle$	\rangle
/	/	\	\backslash
	\vert		\Vert
Î	\uparrow	↑	\Uparrow
$\downarrow$	\downarrow	$\Downarrow$	\Downarrow
¢	\updownarrow	$\uparrow$	\Updownarrow

# Relations (math mode)

$\leq$	∖leq	$\geq$	\geq
$\prec$	\prec	$\succ$	\succ
$\leq$	\preceq	$\succeq$	\succeq
$\ll$	\11	$\gg$	\gg
$\subset$	\subset	$\supset$	\supset
$\subseteq$	\subseteq	$\supseteq$	\supseteq
	\sqsubset		\sqsupset
	\sqsubseteq		\sqsupseteq
$\in$	\in	$\ni$	\ni
H	\vdash	$\neg$	\dashv
$\smile$	∖smile		\mid
$\frown$	\frown		\parallel
$\neq$	\neq	$\perp$	\perp
≡	\equiv	$\cong$	\cong
$\sim$	\sim	$\bowtie$	\bowtie
$\simeq$	\simeq	$\propto$	\propto
$\asymp$	\asymp	Þ	\models
$\approx$	\approx	÷	\doteq
		$\bowtie$	\Join

## "Log-like" functions (math mode)

\arccos	\csc	\ker	\min
\arcsin	\deg	\lg	\Pr
\arctan	\det	\lim	\sec
\arg	\dim	\liminf	\sin
\cos	\exp	\limsup	\sinh
∖cosh	\gcd	\ln	\sup
\cot	\hom	\log	\tan
$\subset$	∖inf	\max	\tanh

# Arrows (math mode)

$\leftarrow$	\leftarrow	$\leftarrow$	\longleftarrow
$\Leftarrow$	\Leftarrow	$\Leftarrow$	\Longleftarrow
$\rightarrow$	\rightarrow	$\longrightarrow$	$\longrightarrow$
$\Rightarrow$	\Rightarrow	$\implies$	$\Longrightarrow$
$\leftrightarrow$	$\leftrightarrow$	$\longleftrightarrow$	$\longleftrightarrow$
$\Leftrightarrow$	\Leftrightarrow	$\iff$	\Longleftrightarrow
$\mapsto$	\mapsto	$\longmapsto$	\longmapsto
$\leftarrow$	\hookleftarrow	$\hookrightarrow$	\hookrightarrow
	$\leftharpoonup$		\rightharpoonup
<u></u>	$\leftharpoondown$		\rightharpoondown
$\rightleftharpoons$	$\ \$	$\sim$	\leadsto
Î	\uparrow	$\uparrow$	\Updownarrow
↑	\Uparrow	7	\nearrow
$\downarrow$	\downarrow	$\searrow$	\searrow
$\Downarrow$	\Downarrow	$\checkmark$	\swarrow

- ↓ \updownarrow
- /swarrow / \nwarrow

# Miscellaneous symbols (math mode)

х	\aleph	/	\prime
$\hbar$	\hbar	Ø	\emptyset
ı	$\perp$ imath	$\nabla$	\nabla
J	∖jmath	$\checkmark$	\surd
$\ell$	\ell	Т	\top
$\wp$	\wp	$\perp$	\bot
R	∖Re		M
$\Im$	\Im	L	\angle
$\partial$	\partial	$\triangle$	\triangle
$\infty$	\infty	\	\backslash
	<b>\Box</b>	$\diamond$	\Diamond
$\forall$	\forall	#	\sharp
Ξ	\exists	÷	\clubsuit
-	\neg	$\diamond$	\diamondsuit
þ	\flat	$\heartsuit$	\heartsuit
þ	\natural	<b></b>	\spadesuit
Ω	\mho		