TEX Reference Card

(for Plain TEX)

Greek Letters

α	\alpha	ι	\iota	ϱ	\varrho
β	\beta	κ	\kappa	σ	\sigma
γ	\gamma	λ	\lambda	ς	\varsigma
δ	\delta	μ	\mu	τ	\tau
ϵ	\epsilon	ν	\nu	υ	\upsilon
ε	\varepsilon	ξ	\xi	ϕ	\phi
ζ	\zeta	o	\o	φ	\varphi
η	\eta	π	\pi	χ	\chi
θ	\theta	ϖ	\varpi	ψ	\psi
ϑ	\vartheta	ρ	\rho	ω	\omega
Γ	\Gamma	Ξ	\Xi	Φ	\Phi
Δ	\Delta	Π	\Pi	Ψ	\Psi
Θ	\Theta	Σ	\Sigma	Ω	\Omega
Λ	\Lambda	Υ	\Upsilon		

Symbols of Type Ord

$\aleph$	\aleph	$\prime$	\prime	$\forall$	\forall
$\hbar$	\hbar	$\emptyset$	\emptyset	$\exists$	\exists
$\imath$	\imath	∇	\nabla	$\neg$	\neg or \lnot
$\jmath$	\jmath	$\surd$	\surd	$\flat$	\flat
ℓ	\ell	$\top$	\top	$\natural$	\natural
$\wp$	\wp	$\bot$	\bot	$\sharp$	\sharp
$\Re$	\Re	$\Vert$	\\\|	$\clubsuit$	\clubsuit
$\Im$	\Im	$\angle$	\angle	$\diamondsuit$	\diamondsuit
∂	\partial	$\triangle$	\triangle	$\heartsuit$	\heartsuit
∞	\infty	$\backslash$	\backslash	$\spadesuit$	\spadesuit

Large Operators

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

Binary Operations

$\pm$	\pm	$\cap$	\cap	$\vee$	\vee or \lor
$\mp$	\mp	$\cup$	\cup	$\wedge$	\wedge or \land
$\setminus$	\setminus	$\uplus$	\uplus	$\oplus$	\oplus
$\cdot$	\cdot	$\sqcap$	\sqcap	$\ominus$	\ominus
$\times$	\times	$\sqcup$	\sqcup	$\otimes$	\otimes
$\ast$	\ast	$\triangleleft$	\triangleleft	$\oslash$	\oslash
$\star$	\star	$\triangleright$	\triangleright	$\odot$	\odot
$\diamond$	\diamond	$\wr$	\wr	$\dagger$	\dagger
$\circ$	\circ	$\bigcirc$	\bigcirc	$\ddagger$	\ddagger
$\bullet$	\bullet	$\bigtriangleup$	\bigtriangleup	$\amalg$	\amalg
$\div$	\div	$\bigtriangledown$	\bigtriangledown		

Page Layout

\hsize=⟨dimen⟩	set width of page
\vsize=⟨dimen⟩	set height of page
\displaywidth=⟨dimen⟩	set width of math displays
\hoffset=⟨dimen⟩	move page horizontally
\voffset=⟨dimen⟩	move page vertically

Relations

$\leq$	\leq or \le	$\geq$	\geq or \ge	$\equiv$	\equiv
$\prec$	\prec	$\succ$	\succ	$\sim$	\sim
$\preceq$	\preceq	$\succeq$	\succeq	$\simeq$	\simeq
$\ll$	\ll	$\gg$	\gg	$\asymp$	\asymp
$\subset$	\subset	$\supset$	\supset	$\approx$	\approx
$\subseteq$	\subseteq	$\supseteq$	\supseteq	$\cong$	\cong
$\sqsubseteq$	\sqsubseteq	$\sqsupseteq$	\sqsupseteq	$\bowtie$	\bowtie
$\in$	\in	$\notin$	\notin	$\ni$	\ni or \owns
$\vdash$	\vdash	$\dashv$	\dashv	$\models$	\models
$\smile$	\smile	$\mid$	\mid	$\doteq$	\doteq
$\frown$	\frown	$\parallel$	\parallel	$\perp$	\perp
$\propto$	\propto				

Most relations can be negated by prefixing them with \not.

$\not\equiv$	\not\equiv	$\notin$	\notin	$\ne$	\ne

Arrows

$\leftarrow$	\leftarrow or \gets	$\longleftarrow$	\longleftarrow
$\Leftarrow$	\Leftarrow	$\Longleftarrow$	\Longleftarrow
$\rightarrow$	\rightarrow or \to	$\longrightarrow$	\longrightarrow
$\Rightarrow$	\Rightarrow	$\Longrightarrow$	\Longrightarrow
$\leftrightarrow$	\leftrightarrow	$\longleftrightarrow$	\longleftrightarrow
$\Leftrightarrow$	\Leftrightarrow	$\Longleftrightarrow$	\Longleftrightarrow
$\mapsto$	\mapsto	$\longmapsto$	\longmapsto
$\hookleftarrow$	\hookleftarrow	$\hookrightarrow$	\hookrightarrow
$\uparrow$	\uparrow	$\Uparrow$	\Uparrow
$\downarrow$	\downarrow	$\Downarrow$	\Downarrow
$\updownarrow$	\updownarrow	$\Updownarrow$	\Updownarrow
$\nearrow$	\nearrow	$\searrow$	\searrow
$\nwarrow$	\nwarrow	$\swarrow$	\swarrow

The \buildrel macro puts one symbol over another. The format is \buildrel⟨superscript⟩\over⟨relation⟩.

$\buildrel\alpha\beta\over\longrightarrow$	\buildrel\alpha\beta\over\longrightarrow
$f(x)\; {\buildrel\rm def\over=} \;x+1$	f(x)\; {\buildrel\rm def\over=} \;x+1

Delimiters

$[$	\lbrack or [	$\{$	\lbrace or \\{	$\langle$	\langle
$]$	\rbrack or]	$\}$	\rbrace or \\}	$\rangle$	\rangle
$\vert$	\vert or |	$\lfloor$	\lfloor	$\lceil$	\lceil
$\Vert$	\Vert or \\\|	$\rfloor$	\rfloor	$\rceil$	\rceil
$[\![$	[\!\[	$(\!($	(\!(	$\langle\!\langle$	\langle\!\langle
$]\!]$	]\!]	$)\!)$	)\!)	$\rangle\!\rangle$	\rangle\!\rangle

Left and right delimiters will be enlarged if they are prefixed with \left or \right. Each \left must have a matching \right, one of which may be an empty delimiter (\left. or \right.). To specify a particular size, use the following:

\bigl, \bigr   \Bigl, \Bigr   \biggl, \biggr

You can also say \bigm for a large delimiter in the middle of a formula, or just \big for one that acts as an ordinary symbol.

Every Time Insertions

\everypar	insert whenever a paragraph begins
\everymath	insert whenever math in text begins
\everydisplay	insert whenever displayed math begins
\everycr	insert after every \cr

Accents

Type	Example	In Math	In Text
hat	$\hat{a}$	\hat	\^
expanding hat	$\widehat{abc}$	\widehat	none
check	$\check{a}$	\check	\v
tilde	$\tilde{a}$	\tilde	\~
expanding tilde	$\widetilde{abc}$	\widetilde	none
acute	$\acute{a}$	\acute	\'
grave	$\grave{a}$	\grave	\`
dot	$\dot{a}$	\dot	\.
double dot	$\ddot{a}$	\ddot	\"
breve	$\breve{a}$	\breve	\u
bar	$\bar{a}$	\bar	\=
vector	$\vec{a}$	\vec	none

The \skew⟨number⟩ command shifts accents for proper positioning, the larger the ⟨number⟩, the more right the shift.

Elementary Math Control Sequences

overline a formula	$\overline{x+y}$	\overline{x+y}
underline a formula	$\underline{x+y}$	\underline{x+y}
square root	$\sqrt{x+2}$	\sqrt{x+2}
higher order roots	$\root n\of{x+2}$	\root n\of{x+2}
fraction	${n+1\over 3}$	{n+1\over 3}
fraction, no line	${n+1\atop 3}$	{n+1\atop 3}
binomial coeff.	${n+1\choose 3}$	{n+1\choose 3}
braced fraction	${n+1\brace 3}$	{n+1\brace 3}
bracketed fraction	${n+1\brack 3}$	{n+1\brack 3}

Commands which specify a style for typesetting formulas:

\displaystyle \textstyle \scriptstyle \scriptscriptstyle

Non-Italic Function Names

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

The following examples use \mathop to create function names.

Example	Command	Plain TEX Definition
$\lim_{x\to2}$	\lim_{x\to2}	\def\lim{\mathop{\rm lim}}
$\log_2$	\log_2	\def\log{\mathop{\rm log}\nolimits}

Footnotes and Insertions

\footnote⟨marker⟩{⟨text⟩}	footnote
\topinsert⟨vmode stuff⟩\endinsert	insert top of page
\pageinsert⟨vmode stuff⟩\endinsert	insert on full page
\midinsert⟨vmode stuff⟩\endinsert	insert middle of page
\underbar{⟨text⟩}	underline text

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Useful Parameters and Conversions

`\day,\month,\year`	the current day, month, year
`\jobname`	name of current job
`\romannumeral`⟨number⟩	convert to lower case roman nums.
`\uppercase{`⟨token list⟩`}`	convert to upper case
`\lowercase{`⟨token list⟩`}`	convert to lower case

Fills, Leaders and Ellipses

Text or Math: … `\dots`
Math: … `\ldots` ⋯ `\cdots` ⋮ `\vdots` ⋱ `\ddots`

The following fill space with the indicated item.
`\hrulefill` `\rightarrowfill` `\leftarrowfill` `\dotfill`

The general format for constructing leaders is

`\leaders`⟨box or rule⟩`\hskip`⟨glue⟩	repeat box or rule
`\leaders`⟨box or rule⟩`\hfill`	fill space with box or rule

TeX Fonts and Magnification

`\rm`	Roman	`\bf`	**Bold**	`\tt`	`Typewriter`
`\sl`	*Slant*	`\it`	*Italic*	`\/`	"italic correction"

`\magnification=`⟨number⟩	scale document by $n/1000$
`\magstep`⟨number⟩	scaling factor of $1.2^n \times 1000$
`\magstephalf`	scalling factor of $\sqrt{1.2}$
`\font\FN=`⟨fontname⟩	load a font, naming it `\FN`
`\font\FN=`⟨fontname⟩ `at` ⟨dimen⟩	load font scaled to dimension
`\font\FN=`⟨fontname⟩ `scaled` ⟨number⟩	load font scaled by $n/1000$
`true` ⟨dimen⟩	dimension with no scaling

Alignment Displays

`\settabs`⟨number⟩`\columns`	set equally spaced tabs
`\settabs\+`⟨sample line⟩`\cr`	set tabs as per sample line
`\+`⟨text_1⟩`&`⟨text_2⟩`&`⋯`\cr`	tabbed text to be typeset
`\halign`	horizontal alignment
`\halign to`⟨dimen⟩	horizontal alignment
`\openup`⟨dimen⟩	add space between lines
`\noalign{`⟨vmode material⟩`}`	insert material after any `\cr`
`\tabskip=`⟨glue⟩	set glue at tab stops
`\omit`	omit the template for a column
`\span`	span two columns
`\multispan`⟨number⟩	span several columns
`\hidewidth`	ignore the width of an entry
`\crcr`	insert `\cr` if one is not present

Boxes

`\hbox to`⟨dimen⟩	hbox of given dimension
`\vbox to`⟨dimen⟩	vbox, bottom justified
`\vtop to`⟨dimen⟩	vbox, top justified
`\vcenter to`⟨dimen⟩	vbox, center justified (math only)
`\rlap`	right overlap material
`\llap`	left overlap material

Overfull Boxes

`\hfuzz`	allowable excess in hboxes
`\vfuzz`	allowable excess in vboxes
`\overfullrule`	width of overfull box marker. To eliminate entirely, set `\overfullrule=0pt`.

Indentation and Itemized Lists

`\indent`	indent
`\noindent`	do not indent
`\parindent=`⟨dimen⟩	set indentation of paragraphs
`\displayindent=`⟨dimen⟩	set indentation of math displays
`\leftskip=`⟨dimen⟩	skip space on left
`\rightskip=`⟨dimen⟩	skip space on right
`\narrower`	make paragraph narrower
`\item{`⟨label⟩`}`	singly indented itemized list
`\itemitem{`⟨label⟩`}`	doubly indented itemized list
`\hangindent=`⟨dimen⟩	hanging indentation for paragraph
`\hangafter=`⟨number⟩	start hanging indent after line n. If $n < 0$, indent first $\lvert n\rvert$ lines.
`\parshape=`⟨number⟩	general paragraph shaping macro

Headers, Footers, and Page Numbers

`\nopagenumbers`	turn off page numbering
`\pageno`	current page number. To get roman nums, set `\pageno=`⟨negative number⟩
`\folio`	current page number, roman num if < 0
`\footline`	material to put at foot of page
`\headline`	material to put at top of page. To leave space, set `\voffset=2\baselineskip`, make room with `\advance\vsize by-\voffset`.

Macro Definitions

`\def\cs{`⟨replacement text⟩`}`	define the macro `\cs`
`\def\cs#1`⋯`#`n`{`⟨repl. text⟩`}`	macro with parameters
`\let\cs=`⟨token⟩	give `\cs` token's current meaning

Advanced Macro Definition Commands

`\long\def`	macro whose args may include `\par`
`\outer\def`	macro not allowed inside definitions
`\global\def` or `\gdef`	definition that transcends grouping
`\edef`	expand while defining macro
`\xdef` or `\global\edef`	global version of `\edef`
`\noexpand`⟨token⟩	do not expand token
`\expandafter`⟨token⟩	expand item after token first
`\futurelet\cs`⟨tok_1⟩⟨tok_2⟩	equals `\let\cs=`⟨tok_2⟩⟨tok_1⟩⟨tok_2⟩
`\csname`…`\endcsname`	create a control sequence name
`\string\cs`	list characters in name, `\ c s`
`\number`⟨number⟩	list of characters in number
`\the`⟨internal quantity⟩	list of tokens giving value of quantity

Conditionals

The general format of a conditional is

`\if`⟨condition⟩⟨true text⟩`\else`⟨false text⟩`\fi`

`\ifnum`⟨num_1⟩⟨relation⟩⟨num_2⟩	compare two integers
`\ifdim`⟨dimen_1⟩⟨relation⟩⟨dimen_2⟩	compare two dimensions
`\ifodd`⟨num⟩	test for an odd integer
`\ifmmode`	test for math mode
`\if`⟨token_1⟩⟨token_2⟩	test if character codes agree
`\ifx`⟨token_1⟩⟨token_2⟩	test if tokens agree
`\ifeof`⟨number⟩	test for end of file
`\iftrue`, `\iffalse`	always true, always false
`\ifcase`⟨number⟩⟨text_0⟩`\or`⟨text_1⟩`\or`⋯ `\or`⟨text_n⟩`\else`⟨text⟩`\fi`	choose text by ⟨number⟩
`\loop` α `\if`… β `\repeat`	loop $\alpha\beta\alpha\cdots\alpha$ until `\if` is false
`\newif\ifblob`	create a new conditional called `\ifblob`
`\blobtrue`	set the conditional `\ifblob` to be true
`\blobfalse`	set the conditional `\ifblob` to be false

Dimensions, Spacing, and Glue

Dimensions are specified as ⟨number⟩⟨unit of measure⟩.
Glue is specified as ⟨dimen⟩ `plus`⟨dimen⟩ `minus`⟨dimen⟩.

point	`pt`	pica	`pc`	inch	`in`	centimeter	`cm`
m width	`em`	x height	`ex`	math unit	`mu`	millimeter	`mm`
1 pc = 12 pt		1 in = 72.72 pt		2.54 cm = 1 in		18 mu = 1 em	

Horizontal Spacing: `\quad` (skip 1em) `\qquad`
Horizontal Spacing (Text): `\thinspace` `\enspace` `\enskip` `\hskip`⟨glue⟩ `\hfil` `\hfill` `\hfilneg`
Horizontal Spacing (Math): thin space `\,` medium space `\>` thick space `\;` neg. thin space `\!` `\mskip`⟨muglue⟩

Vertical Spacing: `\vskip`⟨glue⟩ `\vfil` `\vfill`

`\strut`	box ht & depth of "(", zero width
`\phantom{`⟨text⟩`}`	invisible box with dim of ⟨text⟩
`\vphantom{`⟨text⟩`}`	box ht & depth of ⟨text⟩, zero width
`\hphantom{`⟨text⟩`}`	box width of ⟨text⟩, zero ht & depth
`\smash{`⟨text⟩`}`	typeset ⟨text⟩, set ht & depth to zero
`\raise`⟨dimen⟩`\hbox{`⟨text⟩`}`	raise box up
`\lower`⟨dimen⟩`\hbox{`⟨text⟩`}`	lower box down
`\moveleft`⟨dimen⟩`\vbox{`⟨text⟩`}`	move box left
`\moveright`⟨dimen⟩`\vbox{`⟨text⟩`}`	move box right

Skip Space Between Lines:	`\smallskip \medskip \bigskip`
encourage a break	`\smallbreak \medbreak \bigbreak`
break if no room	`\filbreak`
Set Line Spacing:	`\baselineskip =` ⟨glue⟩
single space	`\baselineskip = 12pt`
1 1/2 space	`\baselineskip = 18pt`
double space	`\baselineskip = 24pt`
Increase Line Spacing	`\openup`⟨dimen⟩
use `\jot`'s	`1\jot = 3pt`
Allow Unjustified Lines	`\raggedright`
Allow Unjustified Pages	`\raggedbottom`

Braces and Matrices

`\matrix`	rectangular array of entries
`\pmatrix`	matrix with parentheses
`\bordermatrix`	matrix with labels on top and left
`\overbrace`	overbrace, may be superscripted
`\underbrace`	underbrace, may be subscripted

For small matrices in text, use the following constructions:

`{a\,b \choose c\,d}`	${a\,b \choose c\,d}$
`\left( {a\atop c} {b\atop d} \right)`	$\left({a\atop c} {b\atop d} \right)$

Displayed Equations

`\eqno`	equation number at right
`\leqno`	equation number at left
`\eqalign`	display several aligned equations
`\eqalignno`	display aligned eqns numbered at right
`\leqalignno`	display aligned eqns numbered at left
`\displaylines`	display several equations, centered
`\cases`	case by case definitions
`\noalign`	to insert space between lines in displays, use `\noalign{\vskip`⟨glue⟩`}` after any `\cr`
`\openup`⟨dimen⟩	add space between all lines in a display