

# The Comprehensive L<sup>A</sup>T<sub>E</sub>X Symbol List

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3 January 2024

## **Abstract**

This document lists 20323 symbols and the corresponding L<sup>A</sup>T<sub>E</sub>X commands that produce them. Some of these symbols are guaranteed to be available in every L<sup>A</sup>T<sub>E</sub>X 2<sub>E</sub> system; others require fonts and packages that may not accompany a given distribution and that therefore need to be installed. All of the fonts and packages used to prepare this document—as well as this document itself—are freely available from the Comprehensive T<sub>E</sub>X Archive Network (<https://www.ctan.org/>).

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# Chapter 1

## Introduction

Welcome to the Comprehensive L<sup>A</sup>T<sub>E</sub>X Symbol List! This document strives to be your primary source of L<sup>A</sup>T<sub>E</sub>X symbol information: font samples, L<sup>A</sup>T<sub>E</sub>X commands, packages, usage details, caveats—everything needed to put tens of thousands of different symbols at your disposal. All of the fonts covered herein meet the following criteria:

1. They are freely available from the Comprehensive T<sub>E</sub>X Archive Network (<https://www.ctan.org/>).
2. All of their symbols have L<sup>A</sup>T<sub>E</sub>X 2<sub>E</sub> bindings. That is, a user should be able to access a symbol by name (e.g., `\bigtriangleup`)

As of version 12 of the Comprehensive L<sup>A</sup>T<sub>E</sub>X Symbol List, that second restriction has been relaxed with the inclusion of Chapter 11, which showcases fonts that provide, at a minimum, either T<sub>E</sub>X font-metric files (`.tfm`) or the METAFONT sources (`.mf`) that produce those font-metric files. Some of the Chapter 11 fonts do include L<sup>A</sup>T<sub>E</sub>X font-definition files (`.fd`). However, what sets the fonts in Chapter 11 apart from the fonts in the rest of the document is that they lack a L<sup>A</sup>T<sub>E</sub>X style file (`.sty`) that individually names each of the glyphs.

The restrictions listed above are not particularly limiting criteria; the Comprehensive L<sup>A</sup>T<sub>E</sub>X Symbol List contains samples of 20323 symbols—quite a large number. Some of these symbols are guaranteed to be available in every L<sup>A</sup>T<sub>E</sub>X 2<sub>E</sub> system; others require fonts and packages that may not accompany a given distribution and that therefore need to be installed. See <http://www.texfaq.org/FAQ-installthings.html> for help with installing new fonts and packages.

### 1.1 Document Usage

Each chapter of this document contains a number of font tables. Each table shows a set of symbols, with the corresponding L<sup>A</sup>T<sub>E</sub>X command to the right of each symbol. A table's caption indicates what package needs to be loaded in order to access that table's symbols. For example, the symbols in Table 46, “textcomp Old-Style Numerals”, are made available by putting “`\usepackage{textcomp}`” in your document's preamble. “*AMS*” means to use the *AMS* packages, viz. `amssymb` and/or `amsmath`. Notes below a table provide additional information about some or all the symbols in that table.

One note that appears a few times in this document, particularly in Chapter 2, indicates that certain symbols do not exist in the OT1 font encoding (Donald Knuth's original, 7-bit font encoding, which is the default font encoding for L<sup>A</sup>T<sub>E</sub>X) and that you should use `fontenc` to select a different encoding, such as T1 (a common 8-bit font encoding). That means that you should put “`\usepackage[⟨encoding⟩]{fontenc}`” in your document's preamble, where *⟨encoding⟩* is, e.g., T1 or LY1. To limit the change in font encoding to the current group, use “`\fontencoding{⟨encoding⟩}\selectfont`”.

Chapter 12 contains some additional information about the symbols in this document. It discusses how certain mathematical symbols can vary in height, shows which symbol names are not unique across packages, gives examples of how to create new symbols out of existing symbols, explains how symbols are spaced in math mode, compares various schemes for boldfacing symbols, presents L<sup>A</sup>T<sub>E</sub>X ASCII and Latin 1 tables, shows how to input and output Unicode characters, and provides some information about this document itself. The Comprehensive L<sup>A</sup>T<sub>E</sub>X Symbol List ends with an index of all the symbols in the document and various additional useful terms.

A companion document, Raw Font Tables, also presents a large number of symbols but with a very different structure from this document. Raw Font Tables includes only symbols produced via a font file, while this document also includes composite symbols (combinations of two or more glyphs) and symbols drawn as pictures (using, e.g., TikZ). This document sorts symbols by category while Raw Font Tables sorts symbols by underlying font file. The two documents are intended to complement each other. It is usually easier to find a desired symbol in The Comprehensive L<sup>A</sup>T<sub>E</sub>X Symbol List, but Raw Font Tables is helpful for identifying related symbols, for finding symbols that exist in some font but are not exposed to the user via a L<sup>A</sup>T<sub>E</sub>X package (or that this document inadvertently overlooked), and for the font name and character position needed to typeset a single symbol in isolation. The last of those is especially important for math symbols. T<sub>E</sub>X imposes a limitation of at most 16 math alphabets per document, but symbols typeset with \font and \char are text symbols and do not consume a math alphabet. (They are less convenient to use within a mathematical expression, however.)

## 1.2 Frequently Requested Symbols

There are a number of symbols that are requested over and over again on `comp.text.tex`. If you're looking for such a symbol the following list will help you find it quickly.

<code>\_</code> , as in “Spaces_are_significant.”	19	<code>\cdot</code>	153
<code>\i</code> , <code>\I</code> , <code>\iI</code> , <code>\iI</code> , etc. (versus <code>\bar{i}</code> , <code>\tilde{i}</code> , <code>\ddot{i}</code> , <code>\breve{i}</code> , and <code>\check{i}</code> )	26	<code>\circ</code> , as in “180°” or “15°C”	160
<code>\P</code>	31	<code>\mathcal{L}</code> , <code>\mathcal{F}</code> , etc.	162
<code>\euro</code>	32	<code>\mathbb{N}</code> , <code>\mathbb{Z}</code> , <code>\mathbb{R}</code> , etc.	162
<code>\circledC</code> , <code>\circledR</code> , and <code>\circledTM</code>	33	<code>\varepsilon</code>	162
<code>\%o</code>	34	<code>\mathfrak{f}</code>	371
<code>\mathfrak{ff}</code>	56	<code>\acute{a}</code> , <code>\grave{e}</code> , etc. (i.e., several accents per character)	373
<code>\dots</code>	68	<code>&lt;</code> , <code>&gt;</code> , and <code> </code> (instead of <code>i</code> , <code>l</code> , and <code>—</code> )	381
<code>\coloneqq</code> and <code>\eqqcolon</code>	69	<code>\hat{}</code> and <code>\tilde{}</code> (or <code>\sim</code> )	382
<code>\lesssim</code> and <code>\gtrsim</code>	85		

# Chapter 2

## Body-text symbols

This chapter lists symbols that are intended for use in running text, such as punctuation marks, accents, ligatures, and currency symbols.

TABLE 1: L<sup>A</sup>T<sub>E</sub>X 2 <sub>$\varepsilon$</sub>  Escapable “Special” Characters

$\$$   $\backslash \$$   $\%$   $\backslash \%$   $_$   $\backslash _$   $*$   $\}$   $\backslash \}$   $\&$   $\backslash \&$   $\#$   $\backslash \#$   $\{$   $\backslash \{$

\* The underscore package redefines “\_” to produce an underscore in text mode (i.e., it makes it unnecessary to escape the underscore character).

TABLE 2: Predefined L<sup>A</sup>T<sub>E</sub>X 2 <sub>$\varepsilon$</sub>  Text-mode Commands

~	\textasciicircum*	<	\textless
*	\textasciitilde*	a	\texta
*	\textasteriskcentered	o	\texto
\	\textbackslash	\P	\textP
	\textbar	.	\textperiod
	\textbardbl	\%oo	\textpercent
○	\textbigcircle	\%o	\textperthousand
{	\textbraceleft†	\`i	\textquestiondown
}	\textbraceright†	“	\textquotedblleft
•	\textbullet	”	\textquotedblright
(C)	\textcopyright†	\`e	\textquotel
†	\textdagger†	,	\textquoter
‡	\textdaggerdbl†	\textcircledR	\textregistered
\$	\textdollar†	\textsection	\textsection†
...	\textellipsis†	\textsterling	\textsterling†
—	\textemdash	\textTM	\texttrademark
-	\textendash	-	\textunderscore†
i	\textexcldown	\textlrcorner	\textvisible
>	\textgreater	\textgreater	\textespace

The first symbol column represents the—sometimes “faked”—symbol that L<sup>A</sup>T<sub>E</sub>X 2 <sub>$\varepsilon$</sub>  provides by default. The second symbol column represents the symbol as redefined by `textcomp` (if `textcomp` redefines it). The `textcomp` package is generally required to typeset Table 2’s symbols in italic, and some symbols additionally require the T1 font encoding for italic.

\* `\^{}{}` and `\~{}{}` can be used instead of `\textasciicircum` and `\textasciitilde`. See the discussion of “`\~{}`” on page 382.

<sup>†</sup> It's generally preferable to use the corresponding symbol from Table 3 because the symbols in that table work properly in both text mode and math mode.

TABLE 3: L<sup>A</sup>T<sub>E</sub>X 2 <sub>$\varepsilon$</sub>  Commands Defined to Work in Both Math and Text Mode

{ \{ - \\_ † † \ddag £ \pounds  
 } \} © © \copyright ... \dots § § \S  
 § \\$ † † \dag ¶ ¶ \P

The first symbol column represents the—sometimes “faked”—symbol that L<sup>A</sup>T<sub>E</sub>X 2 <sub>$\varepsilon$</sub>  provides by default. The second symbol column represents the symbol as redefined by `textcomp` (if `textcomp` redefines it). The `textcomp` package is generally required to typeset Table 3’s symbols in italic, and some symbols additionally require the T1 font encoding for italic.

TABLE 4: *AMS* Commands Defined to Work in Both Math and Text Mode

✓ \checkmark    ® \circledR    ✚ \maltese

TABLE 5: Non-ASCII Letters (Excluding Accented Letters)

å	\aa	D	\DH*	L	\L	ø	\o	p	\th*
Å	\AA	D	\DJ*	ł	\l	œ	\oe	P	\TH*
Æ	\AE	ð	\dj*	D	\NG*	Œ	\OE		
æ	\ae	IJ	\IJ	ŋ	\ng*	ß	\ss		
ð	\dh*	ij	\ij	Ø	\o	SS	\ss		

\* Not available in the OT1 font encoding. Use the `fontenc` package to select an alternate font encoding, such as T1.

TABLE 6: `textgreek` Upright Greek Letters

α	\textalpha	η	\texteta	ν	\textnu	τ	\texttau
β	\textbeta	θ	\texttheta	ξ	\textxi	υ	\textupsilon
γ	\textgamma	ι	\textiota	ο	\textomikron	φ	\textphi
δ	\textdelta	κ	\textkappa	π	\textpi	χ	\textchi
ε	\textepsilon	λ	\textlambda	ρ	\textrho	ψ	\textpsi
ζ	\textzeta	μ	\textmu*	σ	\textsigma	ω	\textomega
A	\textAlpha	H	\textEta	N	\textNu	T	\textTau
B	\textBeta	Θ	\textTheta	Ξ	\textXi	Υ	\textUpsilon
Γ	\textGamma	I	\textIota	Ο	\textOmicron	Φ	\textPhi
Δ	\textDelta	K	\textKappa	Π	\textPi	X	\textChi
E	\textEpsilon	Λ	\textLambda	P	\textRho	Ψ	\textPsi
Z	\textZeta	M	\textMu	Σ	\textSigma	Ω	\textOmega

\* Synonyms for `\textmu` include `\textmicro` and `\textmugreek`.

`textgreek` tries to use a Greek font that matches the body text. As a result, the glyphs may appear slightly different from the above.

Unlike `upgreek` (Table 211 on page 121), `textgreek` works in text mode.

The symbols in this table are intended to be used sporadically throughout a document (e.g., in phrases such as “ $\beta$ -decay”). In contrast, Greek body text can be typeset using the `babel` package’s `greek` (or `poltonikogreek`) option—and, of course, a font that provides the glyphs for the Greek alphabet.

TABLE 7: Letters Used to Typeset African Languages

Đ	\B{D}	đ	\B{d}	ڦ	\m{c}	ڻ	\m{f}	ڮ	\m{k}	ڮ	\m{t}	ڙ	\M{t}	ڙ	\m{z}
ڏ	\B{d}	ڏ	\B{d}	ڏ	\m{D}	ڏ	\m{F}	ڏ	\m{N}	ڏ	\m{T}	ڏ	\T{E}	ڏ	\T{e}
ڦ	\B{H}	ڦ	\B{h}	ڦ	\M{d}	ڦ	\m{G}	ڦ	\m{n}	ڦ	\m{t}	ڦ	\T{o}	ڦ	\T{o}
ڮ	\B{h}	ڮ	\B{h}	ڮ	\M{D}	ڮ	\m{g}	ڮ	\m{o}	ڮ	\m{T}	ڮ	\T{O}	ڮ	\T{o}
ڻ	\B{t}	ڻ	\B{t}	ڻ	\m{d}	ڻ	\m{I}	ڻ	\m{O}	ڻ	\m{u}	ڻ	\m{U}*	ڻ	\T{o}
ڻ	\B{T}	ڻ	\B{T}	ڻ	\m{E}	ڻ	\m{i}	ڻ	\m{P}	ڻ	\m{U}	ڻ	\m{U}*	ڻ	\T{O}
ڻ	\m{b}	ڻ	\m{b}	ڻ	\m{e}	ڻ	\m{J}	ڻ	\m{p}	ڻ	\m{Y}	ڻ	\m{Y}	ڻ	\T{Y}
ڻ	\m{B}	ڻ	\B{E}	ڻ	\M{E}	ڻ	\m{j}	ڻ	\m{s}	ڻ	\m{y}	ڻ	\m{y}	ڻ	\T{y}
ڻ	\m{C}	ڻ	\B{e}	ڻ	\M{e}	ڻ	\m{K}	ڻ	\m{S}	ڻ	\m{z}	ڻ	\m{z}	ڻ	\T{z}

These characters all need the T4 font encoding, which is provided by the `fc` package.

\* `\m{v}` and `\m{V}` are synonyms for `\m{u}` and `\m{U}`.

TABLE 8: Letters Used to Typeset Vietnamese

Ӧ \OHORN σ \ohorn Ӧ \UHORN Ӧ \uhorn

These characters all need the T5 font encoding, which is provided by the `vntex` package.

TABLE 9: Punctuation Marks Not Found in OT1

```
« \guillemetleft* < \guilsinglleft „ \quotedblbase " \textquotedbl
» \guillemetright* > \guilsinglright , \quotesinglbase
```

\* Older versions of L<sup>A</sup>T<sub>E</sub>X misspelled these as `\guillemotleft` and `\guillemotright`. The older names are still retained for backward compatibility.

To get these symbols, use the `fontenc` package to select an alternate font encoding, such as T1.

TABLE 10: pifont Decorative Punctuation Marks

```
• \ding{123} “ \ding{125} ¶ \ding{161} • \ding{163}
• \ding{124} ” \ding{126} : \ding{162}
```

TABLE 11: fontawesome5 Decorative Punctuation Marks and Typographic Symbols

<b>*</b>	\faAsterisk	!	\faExclamation	”	\faQuoteRight
@	\faAt	¶	\faParagraph	/	\faSlash
…	\faEllipsisH	?	\faQuestion		
:	\faEllipsisV	“	\faQuoteLeft		

TABLE 12: tipa Phonetic Symbols

ȝ	\textbabygamma	ȝ	\textglotstop	ɳ	\textrtailn
þ	\textbarb	՚	\texthalflength	ڻ	\textrtailr
ڦ	\textbarc	ڦ	\texthardsign	ڻ	\textrtails
ڦ	\textbard	ڦ	\texthooktop	ڻ	\textrtailt
ڢ	\textbardotlessj	ڦ	\texthtb	ڙ	\textrtailz
ڦ	\textbarg	ڦ	\texthbardotlessj	ڙ	\textrthook
ڦ	\textbarglotstop	ڦ	\texthtc	A	\textsc{a}
ڦ	\textbari	ڦ	\texthtd	B	\textsc{b}
ڦ	\textbarl	ڦ	\texthtg	E	\textsc{e}
ڦ	\textbaro	ڦ	\texthth	G	\textsc{g}
ڦ	\textbarrevglotstop	ڦ	\texththeng	H	\textsc{h}
ڦ	\textbaru	ڦ	\texthtk	ڦ	\textschwa
ڦ	\textbeltl	ڦ	\texthtp	I	\textsci
ڦ	\textbeta	ڦ	\texthtq	J	\textsc{j}
ڦ	\textbullseye	ڦ	\texthtrtaild	L	\textsc{l}
ڦ	\textcelpal	ڦ	\texthtscg	N	\textsc{n}
ڦ	\textchi	ڦ	\texthtt	ڦ	\textcoelig
ڦ	\textcloseepsilon	ڦ	\texthvlig	ڦ	\textcomega
ڦ	\textcloseomega	ڦ	\textinvglotstop	R	\textscr
ڦ	\textcloserevepsilon	ڦ	\textinvscr	a	\textscripta
ڦ	\textcommatailz	ڦ	\texttiota	g	\textscriptg
ڦ	\textcorner	ڦ	\textlambda	v	\textscriptv
ڦ	\textcrb	ڦ	\textlengthmark	u	\textsc{u}
ڦ	\textcrd	ڦ	\textlhookt	Y	\textsc{y}
ڦ	\textcrg	ڦ	\textlhtlongi		\textsecstress
ڦ	\textcrh	ڦ	\textlhtlongy	ڦ	\textsoftsign
ڦ	\textcrinvglotstop	ڦ	\textlonglegr	ڦ	\textstretchc
ڦ	\textcrlambda	ڦ	\textlptr	ڦ	\textctclig
ڦ	\textcrtwo	ڦ	\textltailm	ڦ	\texttshlig
ڦ	\textctc	ڦ	\textltailn	ڦ	\texttheta
ڦ	\textctd	ڦ	\textltilde	ڦ	\textthorn
ڦ	\textctdzlig	ڦ	\textlyoghlig	ڦ	\texttoneletterstem
ڦ	\textctesh	ڦ	\textObardotlessj	ts	\texttslig

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ј	\textctj	ђ	\textOlyoghlig	Ѡ	\textturna
ѿ	\textctn	ѡ	\textomega	Ѽ	\textturncelig
ѿ	\textctt	ѿ	\textopencorner	Ѽ	\textturnh
ѿ	\textcttctclig	ѿ	\textopeno	Ѽ	\textturnk
ѿ	\textctyogh	ѿ	\textpalhook	Ѽ	\textturnlongegr
ѿ	\textctz	ѿ	\textphi	ѿ	\textturnnm
ѿ	\textdctzlig	ѿ	\textpipe	ѿ	\textturnmrleg
ѿ	\textdoublebaresh	ѿ	\textprimstress	ѿ	\textturnnr
ѿ	\textdoublebarpipe	ѿ	\textraiseglotstop	ѿ	\textturnrrtail
ѿ	\textdoublebarslash	ѿ	\textraisevibyi	ѿ	\textturnscripta
ѿ	\textdoublepipe	ѿ	\textramshorns	ѿ	\textturnnt
ѿ	\textdoublevertline	ѿ	\textrevapostrophe	ѿ	\textturnv
ѿ	\textdownstep	ѿ	\textreve	ѿ	\textturnw
ѿ	\textdyoghlig	ѿ	\textrevepsilon	ѿ	\textturny
ѿ	\textdzlig	ѿ	\textrevglotstop	ѿ	\textupsilon
ѿ	\textepsilon	ѿ	\textrevyogh	ѿ	\textupstep
ѿ	\textesh	ѿ	\textrhookrevepsilon	ѿ	\textvertline
ѿ	\textfishhookr	ѿ	\textrhookschwa	ѿ	\textvibyi
ѿ	\textg	ѿ	\textrhicity	ѿ	\textvibyy
ѿ	\textgamma	ѿ	\textrptr	ѿ	\textwynn
ѿ	\textglobfall	ѿ	\textrtaild	ѿ	\textyogh
ѿ	\textglobrise	ѿ	\textrtaill		

tipa defines shortcut characters for many of the above. It also defines a command \tone for denoting tone letters (pitches). See the tipa documentation for more information.

TABLE 13: tipx Phonetic Symbols

ѿ	\textaolig	ѿ	\texthtbardotlessjvar	ѿ	\textrthooklong
ѿ	\textbentailyogh	ѿ	\textinvomega	ѿ	\textscaolig
ѿ	\textbktailgamma	ѿ	\textinvscsa	ѿ	\textscdelta
ѿ	\textctinvglotstop	ѿ	\textinvscripta	ѿ	\textscf
ѿ	\textctjvar	ѿ	\textlfishhookrlig	ѿ	\textscsck
ѿ	\textctstretchc	ѿ	\textlhookfour	ѿ	\textscm
ѿ	\textctstretchcvvar	ѿ	\textlhookp	ѿ	\textscp
ѿ	\textctturnt	ѿ	\textlhti	ѿ	\textscq
ѿ	\textdblig	ѿ	\textlooptoprevesh	ѿ	\textspleftarrow
ѿ	\textdoublebarpipevar	ѿ	\textnrleg	ѿ	\textstretchcvvar
ѿ	\textdoublepipevar	ѿ	\textObullseye	ѿ	\textsubdoublearrow

(continued on next page)

(continued from previous page)

$\downarrow$	<code>\textdownfullarrow</code>	$\downarrow$	<code>\textpalhooklong</code>	$\rightarrow$	<code>\textsubbrightarrow</code>
$\varphi$	<code>\textfemale</code>	$\circ$	<code>\textpalhookvar</code>	$\flat$	<code>\textthornvari</code>
$n$	<code>\textfrbarn</code>	$ $	<code>\textpipevar</code>	$\flat$	<code>\textthornvari</code>
$\ddot{d}$	<code>\textfrhookd</code>	$\wp$	<code>\textqplig</code>	$\flat$	<code>\textthornvariii</code>
$\ddot{d}$	<code>\textfrhookdvar</code>	$\square$	<code>\textrectangle</code>	$\flat$	<code>\textthornvariv</code>
$t$	<code>\textfrhookt</code>	$\neg$	<code>\textretractingvar</code>	$\wr$	<code>\textturnglotstop</code>
$\gamma$	<code>\textfrtailgamma</code>	$\square$	<code>\textrevscl</code>	$\natural$	<code>\textturnsck</code>
$\textcircled{?}$	<code>\textglotstopvari</code>	$\textcircled{y}$	<code>\textrevscr</code>	$\natural$	<code>\textturnscu</code>
$\textcircled{?}$	<code>\textglotstopvari</code>	$\textcircled{a}$	<code>\textrhooka</code>	$\varepsilon$	<code>\textturnthree</code>
$\textcircled{?}$	<code>\textglotstopvari</code>	$\textcircled{e}$	<code>\textrhooke</code>	$\varepsilon$	<code>\textturntwo</code>
$\gamma$	<code>\textgrrgamma</code>	$\textcircled{e}$	<code>\textrhookepsilon</code>	$\circ$	<code>\textuncrfemale</code>
$\textcircled{h}$	<code>\textheng</code>	$\textcircled{o}$	<code>\textrhookopeno</code>	$\uparrow$	<code>\textupfullarrow</code>
$hn$	<code>\texthmlig</code>	$\textcircled{l}$	<code>\textrtailhth</code>		

TABLE 14: wsipa Phonetic Symbols

$\gamma$	<code>\babygamma</code>	$\eta$	<code>\eng</code>	$\eta$	<code>\labdentalnas</code>	$\theta$	<code>\schwa</code>
$b$	<code>\barb</code>	$\sigma$	<code>\er</code>	$\dot{\tau}$	<code>\latfric</code>	$I$	<code>\sci</code>
$d$	<code>\bard</code>	$\int$	<code>\esh</code>	$\dot{\pi}$	<code>\legm</code>	$N$	<code>\scn</code>
$i$	<code>\bari</code>	$\eth$	<code>\eth</code>	$\dot{\tau}$	<code>\legr</code>	$R$	<code>\scr</code>
$l$	<code>\barl</code>	$r$	<code>\flapr</code>	$\dot{\zeta}$	<code>\lz</code>	$a$	<code>\scripta</code>
$\theta$	<code>\baro</code>	$\textcircled{?}$	<code>\glotstop</code>	$\alpha$	<code>\nialpha</code>	$g$	<code>\scriptg</code>
$p$	<code>\barp</code>	$\beta$	<code>\hookb</code>	$\beta$	<code>\nibeta</code>	$v$	<code>\scriptv</code>
$t$	<code>\barsci</code>	$\textcircled{d}$	<code>\hookd</code>	$\chi$	<code>\nichi</code>	$U$	<code>\scu</code>
$\textcircled{v}$	<code>\barscu</code>	$\textcircled{g}$	<code>\hookg</code>	$\varepsilon$	<code>\niepsilon</code>	$Y$	<code>\scy</code>
$u$	<code>\baru</code>	$\textcircled{h}$	<code>\hookh</code>	$\gamma$	<code>\nigamma</code>	$\textcircled{y}$	<code>\slashb</code>
$\odot$	<code>\clickb</code>	$\textcircled{h}$	<code>\hookheng</code>	$\iota$	<code>\niota</code>	$\textcircled{e}$	<code>\slashc</code>
$C$	<code>\clickc</code>	$\textcircled{z}$	<code>\hookrevepsilon</code>	$\lambda$	<code>\nilambda</code>	$\textcircled{d}$	<code>\slashd</code>
$\textcircled{t}$	<code>\clickt</code>	$\textcircled{h}$	<code>\hv</code>	$\omega$	<code>\niomega</code>	$\textcircled{y}$	<code>\slashu</code>
$\textcircled{w}$	<code>\closedniomega</code>	$\textcircled{e}$	<code>\inva</code>	$\phi$	<code>\niph</code>	$d$	<code>\taild</code>
$\textcircled{s}$	<code>\closedrevepsilon</code>	$\textcircled{j}$	<code>\invf</code>	$\sigma$	<code>\nisigma</code>	$\textcircled{q}$	<code>\tailinvr</code>
$\textcircled{b}$	<code>\crossb</code>	$\textcircled{s}$	<code>\invglotstop</code>	$\theta$	<code>\nitheta</code>	$\textcircled{l}$	<code>\taill</code>
$\textcircled{d}$	<code>\crossd</code>	$\textcircled{q}$	<code>\invh</code>	$\upsilon$	<code>\niupsilon</code>	$\textcircled{n}$	<code>\tailn</code>
$\textcircled{h}$	<code>\crossh</code>	$\textcircled{l}$	<code>\invlegr</code>	$\textcircled{n}$	<code>\nj</code>	$\textcircled{c}$	<code>\tailr</code>
$\textcircled{x}$	<code>\crossnilambda</code>	$\textcircled{w}$	<code>\invvm</code>	$\infty$	<code>\oo</code>	$\textcircled{s}$	<code>\tails</code>
$\textcircled{c}$	<code>\curlyc</code>	$\textcircled{x}$	<code>\invr</code>	$\textcircled{o}$	<code>\openo</code>	$t$	<code>\tailt</code>
$\textcircled{f}$	<code>\curlyesh</code>	$\textcircled{v}$	<code>\invscr</code>	$\textcircled{e}$	<code>\reve</code>	$\textcircled{z}$	<code>\tailz</code>

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ȝ	\curlyyogh	v	\invscripta	ȝ	\reveject	ȝ	\tesh
ȝ	\curlyz	ȝ	\invv	ȝ	\revepsilon	þ	\thorn
ȝ	\dlbari	ȝ	\invw	ȝ	\revglotstop	ȝ	\tildel
ȝ	\dz	ȝ	\invy	D	\scd	ȝ	\yogh
ȝ	\ejective	ȝ	\ipagamma	G	\scg		

TABLE 15: *wasysym* Phonetic Symbols

ð	\dh	ə	\inve	ȝ	\roundz	þ	\thorn
D	\DH	ɔ	\openo	ȝ	\Thorn		

TABLE 16: *phonetic* Phonetic Symbols

ȝ	\barj	ȝ	\flap	ȝ	\ibar	v	\rotvara	ȝ	\vari
ȝ	\barlambda	ȝ	\glottal	ȝ	\openo	ȝ	\rotw	ȝ	\varomega
ȝ	\emgma	ȝ	\hausaB	ȝ	\planck	ȝ	\roty	ȝ	\varopeno
ȝ	\engma	ȝ	\hausab	ȝ	\pwedge	ȝ	\schwa	v	\vod
ȝ	\enya	ȝ	\hausad	ȝ	\revD	ȝ	\thorn	ȝ	\voicedh
ȝ	\epsi	ȝ	\hausaD	ȝ	\riota	ȝ	\ubar	ȝ	\yogh
ȝ	\esh	ȝ	\hausak	ȝ	\rotm	ȝ	\udesc		
ȝ	\eth	ȝ	\hausaK	ȝ	\rotOmega	ȝ	\vara		
ȝ	\fj	ȝ	\hookd	ȝ	\rotr	ȝ	\varg		

TABLE 17: *t4phonet* Phonetic Symbols

đ	\textcrd	đ	\texthtd		\textpipe
ȝ	\textcrh	ȝ	\texthtk	ȝ	\textrtaild
ȝ	\textepsilon	ȝ	\texthtp	ȝ	\textrtailt
ȝ	\textesh	ȝ	\texthtt	ȝ	\textschwa
ȝ	\textfjlig	ȝ	\textiota	ȝ	\textscriptv
ȝ	\texthtb	ȝ	\textltailn	ȝ	\textteshlig
ȝ	\texthtc	ȝ	\textopeno	ȝ	\textyogh

The idea behind the *t4phonet* package's phonetic symbols is to provide an interface to some of the characters in the T4 font encoding (Table 7 on the next page) but using the same names as the *tipa* characters presented in Table 12 on page 22.

TABLE 18: *semtrans* Transliteration Symbols

ؚ	\Alif	ؚ	\Ayn
---	-------	---	------

TABLE 19: Text-mode Accents

$\ddot{A}a$	<code>\"{"A}"\"{a}</code>	$\dot{A}a$	<code>\{ {A}\}\ {a}</code> <sup>‡</sup>	$\hat{A}a$	<code>\f{A}\f{a}</code> <sup>¶</sup>	$\tilde{A}a$	<code>\t{A}\t{a}</code>
$\acute{A}a$	<code>\'{A}\'{a}</code>	$\tilde{A}a$	<code>\~{A}\~{a}</code>	$\ddot{A}a$	<code>\G{A}\G{a}</code> <sup>‡</sup>	$\check{A}a$	<code>\u{A}\u{a}</code>
$\dot{A}a$	<code>\.{A}\.{a}</code>	$Aa$	<code>\b{A}\b{a}</code>	$\hat{A}a$	<code>\h{A}\h{a}</code> <sup>§</sup>	$\ddot{A}a$	<code>\U{A}\U{a}</code> <sup>‡</sup>
$\bar{A}a$	<code>\={A}\={a}</code>	$\dot{A}a$	<code>\c{A}\c{a}</code>	$\check{A}a$	<code>\H{A}\H{a}</code>	$\check{A}a$	<code>\U{A}\U{a}</code> <sup>¶</sup>
$\hat{A}a$	<code>\^{"A}"\^{"a}</code>	$\tilde{A}a$	<code>\C{A}\C{a}</code> <sup>¶</sup>	$\dot{A}a$	<code>\k{A}\k{a}</code> <sup>†</sup>	$\check{A}a$	<code>\v{A}\v{a}</code>
$\grave{A}a$	<code>\`{"A}"\`{"a}</code>	$\dot{A}a$	<code>\d{A}\d{a}</code>	$\hat{A}a$	<code>\r{A}\r{a}</code>		
		$\hat{A}a$	<code>\newtie{A}\newtie{a}</code> *			$\tilde{A}a$	<code>\textcircled{A}\textcircled{a}</code>

\* Requires the `textcomp` package.

† Not available in the OT1 font encoding. Use the `fontenc` package to select an alternate font encoding, such as T1.

‡ Requires the T4 font encoding, provided by the `fc` package.

§ Requires the T5 font encoding, provided by the `vntex` package.

¶ Requires one of the Cyrillic font encodings (T2A, T2B, T2C, or X2). Use the `fontenc` package to select an encoding.

|| See also the `circledsteps` package, which uses TikZ to encircle symbols of any size.

Also note the existence of `\i` and `\j`, which produce dotless versions of “i” and “j” (viz., “i” and “j”). These are useful when the accent is supposed to replace the dot in encodings that need to composite (i.e., combine) letters and accents. For example, “na\"{\i}ve” always produces a correct “naïve”, while “na\"{\i}ve” yields the rather odd-looking “naive” when using the OT1 font encoding and older versions of L<sup>A</sup>T<sub>E</sub>X. Font encodings other than OT1 and newer versions of L<sup>A</sup>T<sub>E</sub>X properly typeset “na\"{\i}ve” as “naïve”.

TABLE 20: `tipa` Text-mode Accents

$\acute{A}a$	<code>\textacutemacron{A}\textacutemacron{a}</code>
$\acute{\acute{A}}a$	<code>\textacuteewedge{A}\textacuteewedge{a}</code>
$\dot{A}a$	<code>\textadvancing{A}\textadvancing{a}</code>
$\underline{A}a$	<code>\textbottomtiebar{A}\textbottomtiebar{a}</code>
$\breve{A}a$	<code>\textbrevemacron{A}\textbrevemacron{a}</code>
$\widetilde{A}a$	<code>\textcircumacute{A}\textcircumacute{a}</code>
$\hat{A}a$	<code>\textcircumdot{A}\textcircumdot{a}</code>

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Ãä	\textdotacute{A}\textdotacute{a}
Ãå	\textdotbreve{A}\textdotbreve{a}
Ãä	\textdoublegrave{A}\textdoublegrave{a}
Ãä	\textdoublebaraccent{A}\textdoublebaraccent{a}
Ãä	\textfallrise{A}\textfallrise{a}
Ãä	\textgravecircum{A}\textgravecircum{a}
Ãä	\textgravedot{A}\textgravedot{a}
Ãä	\textgravemacron{A}\textgravemacron{a}
Ãä	\textgravemid{A}\textgravemid{a}
Ãä	\texthighrise{A}\texthighrise{a}
Aä	\textinvsubbridge{A}\textinvsubbridge{a}
Aä	\textlowering{A}\textlowering{a}
Ãä	\textlowrise{A}\textlowrise{a}
Ãä	\textmidacute{A}\textmidacute{a}
Ãä	\textovercross{A}\textovercross{a}
Ãä	\textoverw{A}\textoverw{a}
Aä	\textpolhook{A}\textpolhook{a}
Aä	\textraising{A}\textraising{a}
Aä	\textretracting{A}\textretracting{a}
Ãä	\textringmacron{A}\textringmacron{a}
Ãä	\textrisefall{A}\textrisefall{a}
Ãä	\textroundcap{A}\textroundcap{a}
Aä	\textseagull{A}\textseagull{a}
Aä	\textsubacute{A}\textsubacute{a}
Aä	\textsubarch{A}\textsubarch{a}
Aä	\textsubbar{A}\textsubbar{a}
Aä	\textsubbridge{A}\textsubbridge{a}
Aä	\textsubcircum{A}\textsubcircum{a}
Aä	\textsubdot{A}\textsubdot{a}
Aä	\textsubgrave{A}\textsubgrave{a}
Aä	\textsubhalfring{A}\textsubhalfring{a}
Aä	\textsubplus{A}\textsubplus{a}
Aä	\textsubrhalfring{A}\textsubrhalfring{a}
Aä	\textsubring{A}\textsubring{a}
Aä	\textsubsquare{A}\textsubsquare{a}
Aä	\textsubtilde{A}\textsubtilde{a}

*(continued on next page)*

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$\text{A}\ddot{\text{a}}$	<code>\textsubumlaut{A}\textsubumlaut{a}</code>
$\text{A}\ddot{\text{a}}$	<code>\textsubw{A}\textsubw{a}</code>
$\text{A}\ddot{\text{a}}$	<code>\textsubwedge{A}\textsubwedge{a}</code>
$\text{A}\ddot{\text{a}}$	<code>\textsuperimpostilde{A}\textsuperimpostilde{a}</code>
$\text{A}\ddot{\text{a}}$	<code>\textsyllabic{A}\textsyllabic{a}</code>
$\text{A}\ddot{\text{a}}$	<code>\texttildedot{A}\texttildedot{a}</code>
$\widehat{\text{A}}\widehat{\text{a}}$	<code>\textttoptiebar{A}\textttoptiebar{a}</code>
$\dot{\text{A}}\dot{\text{a}}$	<code>\textvbaraccent{A}\textvbaraccent{a}</code>

`tipa` defines shortcut sequences for many of the above. See the `tipa` documentation for more information.

TABLE 21: extraipa Text-mode Accents

$\text{A}\ddot{\text{a}}$	<code>\bibbridge{A}\bibbridge{a}</code>	$\text{A}\ddot{\text{a}}$	<code>\partvoiceless{A}\partvoiceless{a}</code>
$\text{A}\acute{\text{a}}$	<code>\crttilde{A}\crttilde{a}</code>	$\text{A}\acute{\text{a}}$	<code>\sliding{A}\sliding{a}</code>
$\text{A}\grave{\text{a}}$	<code>\dottedtilde{A}\dottedtilde{a}</code>	$\text{A}\grave{\text{a}}$	<code>\spreadlips{A}\spreadlips{a}</code>
$\text{A}\tilde{\text{a}}$	<code>\doubletilde{A}\doubletilde{a}</code>	$\text{A}\grave{\text{a}}$	<code>\subcorner{A}\subcorner{a}</code>
$\text{A}\ddot{\text{a}}$	<code>\finpartvoice{A}\finpartvoice{a}</code>	$\text{A}\grave{\text{a}}$	<code>\subdoublebar{A}\subdoublebar{a}</code>
$\text{A}\ddot{\text{a}}$	<code>\finpartvoiceless{A}\finpartvoiceless{a}</code>	$\text{A}\grave{\text{a}}$	<code>\subdoublevert{A}\subdoublevert{a}</code>
$\text{A}\acute{\text{a}}$	<code>\inipartvoice{A}\inipartvoice{a}</code>	$\text{A}\grave{\text{a}}$	<code>\sublptr{A}\sublptr{a}</code>
$\text{A}\acute{\text{a}}$	<code>\inipartvoiceless{A}\inipartvoiceless{a}</code>	$\text{A}\grave{\text{a}}$	<code>\subrptr{A}\subrptr{a}</code>
$\text{A}\ddot{\text{a}}$	<code>\overbridge{A}\overbridge{a}</code>	$\text{A}\grave{\text{a}}$	<code>\whistle{A}\whistle{a}</code>
$\text{A}\ddot{\text{a}}$	<code>\partvoice{A}\partvoice{a}</code>		

TABLE 22: wsipa Text-mode Accents

$\text{A}\ddot{\text{a}}$	<code>\dental{A}\dental{a}</code>
$\text{A}\ddot{\text{a}}$	<code>\underarch{A}\underarch{a}</code>

TABLE 23: phonetic Text-mode Accents

$\hat{A}a$	<code>\hill{A}\hill{a}</code>	$\dot{A}a$	<code>\rc{A}\rc{a}</code>	$\ddot{A}a$	<code>\ut{A}\ut{a}</code>
$\ddot{A}a$	<code>\od{A}\od{a}</code>	$\dot{A}a$	<code>\syl{A}\syl{a}</code>		
$\hat{\dot{A}}a$	<code>\ohill{A}\ohill{a}</code>	$\ddot{\dot{A}}a$	<code>\td{A}\td{a}</code>		

The `phonetic` package provides a few additional macros for linguistic accents. `\acbar` and `\acarc` compose characters with multiple accents; for example, `\acbar{'}{a}` produces “á” and `\acarc{"}{e}` produces “ë”. `\labvel` joins two characters with an arc: `\labvel{mn}` → “m̄n”. `\upbar` is intended to go between characters as in “x`\upbar{y}`” → “x̄y”. Lastly, `\uplett` behaves like `\textsuperscript` but uses a smaller font. Contrast “p`\uplett{h}`” → “p<sup>h</sup>” with “p`\textsuperscript{h}`” → “p<sup>h</sup>”.

TABLE 24: metre Text-mode Accents

$\acute{A}a$	<code>\acutus{A}\acutus{a}</code>
$\breve{A}a$	<code>\breve{A}a</code>
$\tilde{A}a$	<code>\circumflexus{A}\circumflexus{a}</code>
$\ddot{A}a$	<code>\diaeresis{A}\diaeresis{a}</code>
$\grave{A}a$	<code>\gravis{A}\gravis{a}</code>
$\bar{A}a$	<code>\macron{A}\macron{a}</code>

TABLE 25: t4phonet Text-mode Accents

$\ddot{A}a$	<code>\textdoublegrave{A}\textdoublegrave{a}</code>
$\acute{A}a$	<code>\textvbaraccent{A}\textvbaraccent{a}</code>
$\ddot{\acute{A}}a$	<code>\textdoublevbaraccent{A}\textdoublevbaraccent{a}</code>

The idea behind the `t4phonet` package’s text-mode accents is to provide an interface to some of the accents in the T4 font encoding (accents marked with “†” in Table 19 on the next page) but using the same names as the `tipa` accents presented in Table 20 on page 26.

TABLE 26: `arcs` Text-mode Accents
 $\widehat{A} \widehat{a} \quad \backslash overarc\{A\}\overarc{a} \quad \underline{A} \underline{a} \quad \backslash underarc\{A\}\underarc{a}$ 

The accents shown above scale only to a few characters wide. An optional macro argument alters the effective width of the accented characters. See the `arcs` documentation for more information.

At the time of this writing (2015/11/12), there exists an incompatibility between the `arcs` package and the `relsize` package, upon which `arcs` depends. As a workaround, one should apply the patch proposed by Michael Sharpe on the X<sub>E</sub>T<sub>E</sub>X mailing list (Subject: “The `arcs` package”, dated 2013/08/25) to prevent spurious text from being added to the document (as in, “5.0pt $\widehat{A}$ ” when “ $\widehat{A}$ ” is expected).

TABLE 27: `semtrans` Accents
 $\AA \aa \quad \backslash D\{A\}\D\{a\} \quad \AA \aa \quad \backslash U\{A\}\U\{a\}$ 
  
 $\nabla \nabla \quad \backslash T\{A\}\T\{a\}^*$ 

\*  $\T$  is not actually an accent but a command that rotates its argument 180° using the `graphicx` package’s `\rotatebox` command.

TABLE 28: `ogonek` Accents
 $\AA \aa \quad \backslash k\{A\}\k\{a\}$ 
TABLE 29: `combelow` Accents
 $\AA \aa \quad \backslash cb\{A\}\cb\{a\}$ 

`\cb` places a comma *above* letters with descenders. Hence, while “`\cb{s}`” produces “ $\mathring{s}$ ”, “`\cb{g}`” produces “ $\mathring{g}$ ”.

TABLE 30: wsipa Diacritics

' \ain	< \leftp	' \overring	' \stress	' \underwedge
‐ \corner	‐ \leftt	‐ \polishhook	‐ \syllabic	‐ \upp
‐ \downp	: \length	‐ \rightp	‐ \underdots	‐ \upt
‐ \downt	‐ \midtilde	‐ \rightt	‐ \underring	
‐ \halflength	‐ \open	‐ \secstress	‐ \undertilde	

The `wsipa` package defines all of the above as ordinary characters, not as accents. However, it does provide `\diatop` and `\diaunder` commands, which are used to compose diacritics with other characters. For example, `\diatop[\overring|a]` produces “å”, and `\diaunder[\underdots|a]` produces “ä”. See the `wsipa` documentation for more information.

TABLE 31: textcomp Diacritics

" \textacutedbl	‐ \textasciicaron	‐ \textasciimacron
‐ \textasciiaacute	‐ \textasciidieresis	‐ \textgravedbl
‐ \textasciibreve	‐ \textasciigrave	

The `textcomp` package defines all of the above as ordinary characters, not as accents. You can use `\llap` or `\rlap` to combine them with other characters. See the discussion of `\llap` and `\rlap` on page 372 for more information.

TABLE 32: marvosym Diacritics

‐ \arrowOver	‐ \barOver	/ \StrikingThrough
‐ \ArrowOver	‐ \BarOver	

The `marvosym` package defines all of the above as ordinary characters, not as accents. You can use `\llap` or `\rlap` to combine them with other characters. See the discussion of `\llap` and `\rlap` on page 372 for more information.

TABLE 33: textcomp Currency Symbols

฿ \textbaht	\$ \textdollar*	₲ \textguarani	₩ \textwon
₵ \textcent	\$ \textdollaroldstyle	£ \textlira	¥ \textyen
₵ \textcentoldstyle	đ \textdong	₦ \textnaira	
₵ \textcolonmonetary	€ \texteuro	P \textpeso	
₵ \textcurrency	f \textflorin	£ \textsterling*	

\* It's generally preferable to use the corresponding symbol from Table 3 on page 19 because the symbols in that table work properly in both text mode and math mode.

TABLE 34: *marvosym* Currency Symbols

$\text{\textsterling}$	$\text{\Denarius}$	$\text{\texteuro}$	$\text{\EURcr}$	$\text{\texteuro}$	$\text{\EURtm}$	$\text{\texteuro}$	$\text{\Pfund}$
$\text{\texteuro}$	$\text{\Ecommerce}$	$\text{\texteuro}$	$\text{\EURdig}$	$\text{\textdollar}$	$\text{\EyesDollar}$	$\beta$	$\text{\Shilling}$
$\text{\texteuro}$	$\text{\EUR}$	$\text{\texteuro}$	$\text{\EURhv}$	$\text{\texteuro}$	$\text{\Florin}$		

The different euro signs are meant to be visually compatible with different fonts—Courier ( $\text{\EURcr}$ ), Helvetica ( $\text{\EURhv}$ ), Times Roman ( $\text{\EURtm}$ ), and the *marvosym* digits listed in Table 320 ( $\text{\EURdig}$ ). The *mathdesign* package redefines  $\text{\texteuro}$  to be visually compatible with one of three additional fonts: Utopia ( $\text{\texteuro}$ ), Charter ( $\text{\texteuro}$ ), or Garamond ( $\text{\texteuro}$ ).

TABLE 35: *fontawesome5* Currency Symbols

$\text{\texteuro}$	$\text{\faBtc}$	$\text{\texteuro}$	$\text{\faLiraSign}$	$\text{\texteuro}$	$\text{\faShekelSign}$	$\text{\texteuro}$	$\text{\faYenSign}$
$\text{\texteuro}$	$\text{\faDollarSign}$	$\text{\texteuro}$	$\text{\faPoundSign}$	$\text{\texteuro}$	$\text{\faTenge}$		
$\text{\texteuro}$	$\text{\faEuroSign}$	$\text{\texteuro}$	$\text{\faRubleSign}$	$\text{\texteuro}$	$\text{\faViacoin}$		
$\text{\texteuro}$	$\text{\faHryvnia}$	$\text{\texteuro}$	$\text{\faRupeeSign}$	$\text{\texteuro}$	$\text{\faWonSign}$		

TABLE 36: *wasysym* Currency Symbols

$\text{\texteuro}$     $\text{\cent}$     $\text{\texteuro}$     $\text{\texteuro}$     $\text{\texteuro}$     $\text{\texteuro}$     $\text{\texteuro}$     $\text{\texteuro}$

\*  $\text{\texteuro}$  is also available as  $\text{\euro}$  unless you specify the *noeuro* package option.

TABLE 37: *GfNA2e* Currency Symbols

$\text{\texteuro}$     $\text{\texteuro}$     $\text{\texteuro}$

TABLE 38: *teubner* Currency Symbols

$\text{\texteuro}$	$\text{\denarius}$	$\text{\texteuro}$	$\text{\hemiobelion}$	$\text{\texteuro}$	$\text{\tetartemorion}$
$\text{\texteuro}$	$\text{\dracma}$	$\text{\texteuro}$	$\text{\stater}$		

TABLE 39: *tfrupee* Currency Symbols

$\text{\texteuro}$     $\text{\rupee}$

TABLE 40: eurosym Euro Signs

```
€ \geneuro € \geneuronarrow € \geneurowide € \official euro
```

`\euro` is automatically mapped to one of the above—by default, `\official euro`—based on a `eurosym` package option. See the `eurosym` documentation for more information. The `\geneuro...` characters are generated from the current body font’s “C” character and therefore may not appear exactly as shown.

TABLE 41: fourier Euro Signs

```
€ \eurologo € \texteuro
```

TABLE 42: textcomp Legal Symbols

(P) \textcircledP	(C) \textcopyright	SM \textservicemark
(D) \textcopyleft	(R) \textregistered	TM \texttrademark

The first symbol column represents the—sometimes “faked”—symbol that L<sup>A</sup>T<sub>E</sub>X 2<sub>E</sub> provides by default. The second symbol column represents the symbol as redefined by `textcomp`. The `textcomp` package is generally required to typeset Table 42’s symbols in italic.

See <http://www.texfaq.org/FAQ-tradesyms.html> for solutions to common problems that occur when using these symbols (e.g., getting a “(R)” when you expected to get a “(R)”).

TABLE 43: fontawesome5 Legal Symbols

© \faCopyright	© \faCreativeCommonsRemix
© \faCopyright[regular]	© \faCreativeCommonsSa
cc \faCreativeCommons	© \faCreativeCommonsSampling
© \faCreativeCommonsBy	© \faCreativeCommonsSamplingPlus
© \faCreativeCommonsNc	© \faCreativeCommonsShare
© \faCreativeCommonsNcEu	© \faCreativeCommonsZero
© \faCreativeCommonsNcJp	R \faRegistered
© \faCreativeCommonsNd	R \faRegistered[regular]
© \faCreativeCommonsPd*	TM \faTrademark
© \faCreativeCommonsPd	

TABLE 44: *cclicenses* Creative Commons License Icons

	\cc		\ccby		\ccnc*		\ccnd		\ccsa*
--	-----	--	-------	--	--------	--	-------	--	--------

\* These symbols utilize the *rotating* package and therefore display improperly in some DVI viewers.

TABLE 45: *ccicons* Creative Commons License Icons

	\ccAttribution		\ccNonCommercialEU		\ccShare
	\ccCopy		\ccNonCommercialJP		\ccShareAlike
	\ccLogo		\ccPublicDomain		\ccZero
	\ccNoDerivatives		\ccRemix		
	\ccNonCommercial		\ccSampling		

*ccicons* additionally defines a set of commands for typesetting many complete Creative Commons licenses (i.e., juxtapositions of two or more of the preceding icons). For example, the \ccbyncnd command typesets the “Attribution–Noncommercial–No Derivative Works” license (“”). See the *ccicons* documentation for more information.

TABLE 46: *textcomp* Old-style Numerals

0	\textzerooldstyle	4	\textfouroldstyle	8	\texteightoldstyle
1	\textoneoldstyle	5	\textfiveoldstyle	9	\textnineoldstyle
2	\texttwooldstyle	6	\textsixoldstyle		
3	\textthreeoldstyle	7	\textsevenoldstyle		

Rather than use the bulky \textoneoldstyle, \texttwooldstyle, etc. commands shown above, consider using \oldstylenums{...} to typeset an old-style number.

TABLE 47: Miscellaneous *textcomp* Symbols

b	\textblank	¶	\textpilcrow
'	\textbrokenbar	'	\textquotesingle
=	\textdblhyphen	,	\textquotestraightbase
=	\textdblhyphenchar	"	\textquotestraightdblbase
%	\textdiscount	R	\textrecipe
E	\textestimated	*	\textreferencemark
?	\textinterrobang	—	\textthreequartersemdash
↳	\textinterrobangdown	~	\texttildelow
Nº	\textnumero	—	\texttwelveudash
o	\textopenbullet		

TABLE 48: Miscellaneous `wasysym` Text-mode Symbols

f \longs % \permil § \wasyparagraph\*

\* `wasysym` defines `\Paragraph` as a synonym for `\wasyparagraph`.

# Chapter 3

## Mathematical symbols

Most, but not all, of the symbols in this chapter are math-mode only. That is, they yield a “`Missing $ inserted`” error message if not used within `$...$`, `\[...\]`, or another math-mode environment. Operators marked as “variable-sized” are taller in displayed formulas, shorter in in-text formulas, and possibly shorter still when used in various levels of superscripts or subscripts.

Alphanumeric symbols (e.g., “ $\mathcal{L}$ ” and “ $\mathbb{Z}$ ”) are usually produced using one of the math alphabets in Table 348 rather than with an explicit symbol command. Look there first if you need a symbol for a transform, number set, or some other alphanumeric.

Although there have been many requests on `comp.text.tex` for a contradiction symbol, the ensuing discussion invariably reveals innumerable ways to represent contradiction in a proof, including “ $\dashv$ ” (`\blitza`), “ $\Rightarrow\Leftarrow$ ” (`\Rightarrow\Leftarrow`), “ $\perp$ ” (`\bot`), “ $\leftrightarrow$ ” (`\nleqrightarrow`), and “ $\divideontimes$ ” (`\textreferencemark`). Because of the lack of notational consensus, it is probably better to spell out “Contradiction!” than to use a symbol for this purpose. Similarly, discussions on `comp.text.tex` have revealed that there are a variety of ways to indicate the mathematical notion of “is defined as”. Common candidates include “ $\triangleq$ ” (`\triangleq`), “ $\equiv$ ” (`\equiv`), “ $\coloneqq$ ” (*various*<sup>1</sup>), and “ $\stackrel{\text{def}}{=}$ ” (`\stackrel{\text{def}}{=}`). See also the example of `\equalsfill` on page 374. Depending upon the context, disjoint union may be represented as “ $\coprod$ ” (`\coprod`), “ $\sqcup$ ” (`\sqcup`), “ $\cup$ ” (`\dotcup`), “ $\oplus$ ” (`\oplus`), “ $\amalg$ ” (`\amalg`), or any of a number of other symbols.<sup>2</sup> Finally, the average value of a variable  $x$  is written by some people as “ $\overline{x}$ ” (`\overline{x}`), by some people as “ $\langle x \rangle$ ” (`\langle x \rangle`), and by some people as “ $\bar{x}$ ” or “ $\overline{\mathcal{O}x}$ ” (`\diameter x` or `\varnothing x`). The moral of the story is that you should be careful always to explain your notation to avoid confusing your readers.

TABLE 49: Math-mode Versions of Text Symbols

<code>\$</code>	<code>\mathdollar</code>	<code>\P</code>	<code>\mathparagraph</code>	<code>\£</code>	<code>\mathsterling</code>
<code>...</code>	<code>\mathellipsis</code>	<code>\S</code>	<code>\mathsection</code>	<code>-</code>	<code>\mathunderscore</code>

It’s generally preferable to use the corresponding symbol from Table 3 on page 19 because the symbols in that table work properly in both text mode and math mode.

<sup>1</sup>In `txfonts`, `pxfonts`, and `mathtools` the symbol is called `\coloneqqq`. In `mathabx` and `MnSymbol` it’s called `\coloneqq`. In `colonequals` it’s called `\colonequals`.

<sup>2</sup>Bob Tennent listed these and other disjoint-union symbol possibilities in a November 2007 post to `comp.text.tex`.

TABLE 50: logix Math-mode Versions of Text Symbols

&	\AAnd	†	\Dagger	\	\LeftSlash	'	\SingleQuote
&	\Ampersand	‡	\Daggerr		\LngVrtBar	~	\Tild
`	\BackQuote	††	\Dagger	#	\Numbr	""	\TripleQuote
	\BndBar	‡‡	\Ddagger	%	\Percnt	_	\Underscore
^	\Circumflex	\$	\Dollar	?	\Question		
,	\Coma	"	\DoubleQuote	/	\RightSlash		
©	\Cpyrght	!	\Exclaim	;	\Semicln		

logix requires either  $\text{Lua}\text{\LaTeX}$  or  $\text{Xe}\text{\LaTeX}$ .

TABLE 51: logix Basic Operators

*	\Asterick	⊕	\CircMinusPlus	÷	\Divd	-	\Minus
⊗	\CircAsterick	⊕	\CircPls	/	\Divide	≠	\MinusPlus
⊕	\CircDivd	⊕	\CircPlusMinus	÷	\DMinus	+	\Pls
⊖	\CircDivide	⊗	\CircTimes	+	\DPlus	±	\PlusMinus
⊖	\CircMinus	*	\DAsterisk	×	\DTimes	×	\Times

logix requires either  $\text{Lua}\text{\LaTeX}$  or  $\text{Xe}\text{\LaTeX}$ .

TABLE 52: cmll Unary Operators

!	\oc*	↑	\shneg	?	\wn*
‡	\shift	↓	\shpos		

\*  $\oc$  and  $\wn$  differ from “!” and “?” in terms of their math-mode spacing:  $\$A=\!B\$$  produces “ $A =!B$ ”, for example, while  $\$A=\oc B\$$  produces “ $A = !B$ ”.

TABLE 53: Binary Operators

II	\amalg	∪	\cup	⊕	\oplus	×	\times
*	\ast	†	\dagger	⊖	\oslash	△	\triangleleft
○	\bigcirc	‡	\ddagger	⊗	\otimes	▷	\triangleright
▽	\bigtriangledown	◊	\diamond	±	\pm	⊓	\unlhd*
△	\bigtriangleup	÷	\div	▷	\rhd*	⊒	\unrhd*
•	\bullet	◁	\lhd*	＼	\setminus	⊕	\uplus
∩	\cap	⊤	\mp	⊓	\sqcap	∨	\vee
·	\cdot	⊙	\odot	⊑	\sqcup	∧	\wedge
◦	\circ	⊖	\ominus	★	\star	⌞	\wr

\* Not predefined by the  $\text{\LaTeX} 2\epsilon$  core. Use the `latexsym` package to expose this symbol.

TABLE 54:  $\mathcal{AM}$ S Binary Operators

$\barwedge$	<code>\barwedge</code>	$\circledcirc$	<code>\circledcirc</code>	$\intercal$	<code>\intercal</code> *
$\boxdot$	<code>\boxdot</code>	$\circledddash$	<code>\circledddash</code>	$\leftthreetimes$	<code>\leftthreetimes</code>
$\boxminus$	<code>\boxminus</code>	$\Cup$	<code>\Cup</code>	$\ltimes$	<code>\ltimes</code>
$\boxplus$	<code>\boxplus</code>	$\curlyvee$	<code>\curlyvee</code>	$\rightthreetimes$	<code>\rightthreetimes</code>
$\boxtimes$	<code>\boxtimes</code>	$\curlywedge$	<code>\curlywedge</code>	$\rtimes$	<code>\rtimes</code>
$\Cap$	<code>\Cap</code>	$\divideontimes$	<code>\divideontimes</code>	$\smallsetminus$	<code>\smallsetminus</code>
$\centerdot$	<code>\centerdot</code>	$\dotplus$	<code>\dotplus</code>	$\veebar$	<code>\veebar</code>
$\circledast$	<code>\circledast</code>	$\doublebarwedge$	<code>\doublebarwedge</code>		

\* Some people use a superscripted `\intercal` for matrix transpose: “ $A^{\intercal}$ ”  $\mapsto A^T$ . (See the May 2009 `comp.text.tex` thread, “raising math symbols”, for suggestions about altering the height of the superscript.) `\top` (Table 223 on page 123), `T`, and `\mathsf{T}` are other popular choices: “ $A^\top$ ”, “ $A^T$ ”, “ $A^{\intercal}$ ”.

TABLE 55: stmaryrd Binary Operators

$\baro$	<code>\baro</code>	$\interleave$	<code>\interleave</code>	$\varoast$	<code>\varoast</code>
$\bbslash$	<code>\bbslash</code>	$\leftslice$	<code>\leftslice</code>	$\varobar$	<code>\varobar</code>
$\binampersand$	<code>\binampersand</code>	$\merge$	<code>\merge</code>	$\varobslash$	<code>\varobslash</code>
$\bindnasrepma$	<code>\bindnasrepma</code>	$\minuso$	<code>\minuso</code>	$\varocircle$	<code>\varocircle</code>
$\boxast$	<code>\boxast</code>	$\moo$	<code>\moo</code>	$\varodot$	<code>\varodot</code>
$\boxbar$	<code>\boxbar</code>	$\nplus$	<code>\nplus</code>	$\varogt$	<code>\varogt</code>
$\boxbox$	<code>\boxbox</code>	$\obar$	<code>\obar</code>	$\varoles$	<code>\varoles</code>
$\boxbslash$	<code>\boxbslash</code>	$\oblong$	<code>\oblong</code>	$\varominus$	<code>\varominus</code>
$\boxcircle$	<code>\boxcircle</code>	$\obslash$	<code>\obslash</code>	$\varoplus$	<code>\varoplus</code>
$\boxdot$	<code>\boxdot</code>	$\ogreaterthan$	<code>\ogreaterthan</code>	$\varoslash$	<code>\varoslash</code>
$\boxempty$	<code>\boxempty</code>	$\olessthan$	<code>\olessthan</code>	$\varotimes$	<code>\varotimes</code>
$\boxslash$	<code>\boxslash</code>	$\ovee$	<code>\ovee</code>	$\varovee$	<code>\varovee</code>
$\curlyveedownarrow$	<code>\curlyveedownarrow</code>	$\owedge$	<code>\owedge</code>	$\varowedge$	<code>\varowedge</code>
$\curlyveeuparrow$	<code>\curlyveeuparrow</code>	$\rightslice$	<code>\rightslice</code>	$\vartimes$	<code>\vartimes</code>
$\curlywedgedownarrow$	<code>\curlywedgedownarrow</code>	$\sslash$	<code>\sslash</code>	$\Ydown$	<code>\Ydown</code>
$\curlywedgeuparrow$	<code>\curlywedgeuparrow</code>	$\talloblong$	<code>\talloblong</code>	$\Yleft$	<code>\Yleft</code>
$\fatbslash$	<code>\fatbslash</code>	$\varbigcirc$	<code>\varbigcirc</code>	$\Yright$	<code>\Yright</code>
$\fatsemi$	<code>\fatsemi</code>	$\varcurlyvee$	<code>\varcurlyvee</code>	$\Yup$	<code>\Yup</code>
$\fatslash$	<code>\fatslash</code>	$\varcurlywedge$	<code>\varcurlywedge</code>		

TABLE 56: wasysym Binary Operators

$\lhd$	<code>\lhd</code>	$\circ$	<code>\circ</code>	$\RHD$	<code>\RHD</code>
$\LHD$	<code>\LHD</code>	$\triangleright$	<code>\rhd</code>	$\unlhd$	<code>\unlhd</code>

TABLE 57: txfonts/pfxfonts Binary Operators

$\oslash$	<code>\circledbar</code>	$\oslash$	<code>\circledwedge</code>	$\circ$	<code>\medcirc</code>
$\oslash$	<code>\circledbslash</code>	$\wp$	<code>\invamp</code>	$\sqcap$	<code>\sqcapplus</code>
$\oslash$	<code>\circledvee</code>	$\bullet$	<code>\medbullet</code>	$\sqcup$	<code>\sqcupplus</code>

TABLE 58: mathabx Binary Operators

$*$	<code>\ast</code>	$\wedge$	<code>\curlywedge</code>	$\sqcap$	<code>\sqcap</code>
$\ast$	<code>\Asterisk</code>	$\div$	<code>\divdot</code>	$\sqcup$	<code>\sqcup</code>
$\wedge$	<code>\barwedge</code>	$\divideontimes$	<code>\divideontimes</code>	$\sqcap\!\!\sqcap$	<code>\sqdoublecap</code>
$\star$	<code>\bigstar</code>	$\dotdiv$	<code>\dotdiv</code>	$\sqcup\!\!\sqcup$	<code>\sqdoublecup</code>
$\star$	<code>\bigvarstar</code>	$\dotplus$	<code>\dotplus</code>	$\square$	<code>\square</code>
$\blacklozenge$	<code>\blackdiamond</code>	$\dottimes$	<code>\dottimes</code>	$\squplus$	<code>\squplus</code>
$\cap$	<code>\cap</code>	$\doublebarwedge$	<code>\doublebarwedge</code>	$\cdot$	<code>\udot</code>
$\circ$	<code>\circplus</code>	$\doublecap$	<code>\doublecap</code>	$\oplus$	<code>\uplus</code>
$\circ$	<code>\coasterisk</code>	$\doublecup$	<code>\doublecup</code>	$\star$	<code>\varstar</code>
$\ast$	<code>\coAsterisk</code>	$\ltimes$	<code>\ltimes</code>	$\vee$	<code>\vee</code>
$\ast$	<code>\convolution</code>	$\opluscirc$	<code>\opluscirc</code>	$\veebar$	<code>\veebar</code>
$\cup$	<code>\cup</code>	$\rtimes$	<code>\rtimes</code>	$\veedoublebar$	<code>\veedoublebar</code>
$\vee$	<code>\curlyvee</code>	$\sqbullet$	<code>\sqbullet</code>	$\wedge$	<code>\wedge</code>

Many of the preceding glyphs go by multiple names. `\centerdot` is equivalent to `\sqbullet`, and `\ast` is equivalent to  $*$ . `\Asterisk` produces the same glyph as `\ast`, but as an ordinary symbol, not a binary operator. Similarly, `\bigast` produces a large-operator version of the `\Asterisk` binary operator, and `\bigcoast` produces a large-operator version of the `\coAsterisk` binary operator.

TABLE 59: MnSymbol Binary Operators

$\amalg$	<code>\amalg</code>	$\sqcup$	<code>\doublesqcup</code>	$\therefore$	<code>\righttherefore</code>
$\ast$	<code>\ast</code>	$\wedge$	<code>\doublevee</code>	$\times$	<code>\rightthreetimes</code>
$\backslash$	<code>\backslashbackslashdiv</code>	$\wedge$	<code>\doublewedge</code>	$\succ$	<code>\rightY</code>
$\bowtie$	<code>\bowtie</code>	$\therefore$	<code>\downtherefore</code>	$\times$	<code>\rtimes</code>
$\bullet$	<code>\bullet</code>	$\succ$	<code>\downY</code>	$\times$	<code>\slashdiv</code>
$\cap$	<code>\cap</code>	$\times$	<code>\dtimes</code>	$\Pi$	<code>\smallprod</code>
$\cdot$	<code>\cdot</code>	$\therefore$	<code>\fivedots</code>	$\sqcap$	<code>\sqcap</code>
$\capdot$	<code>\cdot</code>	$\infty$	<code>\hbiopropto</code>	$\sqcap$	<code>\sqcapdot</code>
$\capplus$	<code>\capplus</code>	$\ldots$	<code>\hddotdot</code>	$\sqcap$	<code>\sqcapplus</code>
$\cdot$	<code>\cdot</code>	$\sqcap$	<code>\lefthalfcap</code>	$\sqcup$	<code>\sqcup</code>
$\circ$	<code>\circ</code>				

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$\forall$	<code>\closedcurlyvee</code>	$\sqcup$	<code>\lefthalfcup</code>	$\sqcupdot$	<code>\sqcupdot</code>
$\wedge$	<code>\closedcurlywedge</code>	$\cdot:$	<code>\lefttherefore</code>	$\sqcupplus$	<code>\sqcupplus</code>
$\cup$	<code>\cup</code>	$\times$	<code>\leftthreetimes</code>	$\sqcupdots$	<code>\sqcupdots</code>
$\sqcupdot$	<code>\cupdot</code>	$\leftarrow$	<code>\leftY</code>	$\times$	<code>\times</code>
$\sqcupplus$	<code>\cupplus</code>	$\bowtie$	<code>\ltimes</code>	$\cdot\cdot$	<code>\cdot\cdot</code>
$\vee$	<code>\curlyvee</code>	$\backslash$	<code>\medbackslash</code>	$\therefore$	<code>\uptherefore</code>
$\forall$	<code>\curlyveedot</code>	$\circ$	<code>\medcircle</code>	$\upY$	<code>\upY</code>
$\wedge$	<code>\curlywedge</code>	$\swarrow$	<code>\medslash</code>	$\utimes$	<code>\utimes</code>
$\wedge$	<code>\curlywedgedot</code>	$\mid$	<code>\medvert</code>	$\varepsilon$	<code>\vbipropto</code>
$\cdot\cdot$	<code>\ddotdotdot</code>	$\dashv$	<code>\medvertdot</code>	$\cdot\cdot$	<code>\vdotdot</code>
$\cdot\cdot$	<code>\diamondonddots</code>	$-$	<code>\minus</code>	$\vee$	<code>\vee</code>
$\div$	<code>\div</code>	$\div$	<code>\minusdot</code>	$\vee$	<code>\vee</code>
$\cdot\cdot$	<code>\dotmedvert</code>	$\mp$	<code>\mp</code>	$\bowtie$	<code>\vertbowtie</code>
$\cdot\cdot$	<code>\dotminus</code>	$\wp$	<code>\neswbipropto</code>	$\cdot\cdot$	<code>\vertdiv</code>
$\cap$	<code>\doublecap</code>	$\wp$	<code>\nwsebipropto</code>	$\wedge$	<code>\wedge</code>
$\cup$	<code>\doublecup</code>	$+$	<code>\plus</code>	$\wedge$	<code>\wedge</code>
$\wr$	<code>\doublecurlyvee</code>	$\pm$	<code>\pm</code>	$\wr$	<code>\wr</code>
$\wedge$	<code>\doublecurlywedge</code>	$\negthickspace\lrcorner$	<code>\righthalfcap</code>		
$\cap$	<code>\doublesqcap</code>	$\lrcorner$	<code>\righthalfcup</code>		

MnSymbol defines `\setminus` and `\smallsetminus` as synonyms for `\medbackslash`; `\Join` as a synonym for `\bowtie`; `\wr` as a synonym for `\wreath`; `\shortmid` as a synonym for `\medvert`; `\Cap` as a synonym for `\doublecap`; `\Cup` as a synonym for `\doublecup`; and, `\uplus` as a synonym for `\cupplus`.

TABLE 60: `fdsymbol` Binary Operators

$\amalg$	<code>\amalg</code>	$\sqcup$	<code>\doublesqcup</code>	$\rightarrow$	<code>\rightY</code>
$\ast$	<code>\ast</code>	$\sqcap$	<code>\doublevee</code>	$\rtimes$	<code>\rtimes</code>
$\barwedge$	<code>\barwedge</code>	$\wedge$	<code>\doublewedge</code>	$\setminus$	<code>\setminus</code>
$\bowtie$	<code>\bowtie</code>	$\downarrow$	<code>\downY</code>	$\sqcap$	<code>\sqcap</code>
$\cap$	<code>\cap</code>	$\times$	<code>\dtimes</code>	$\sqcapdot$	<code>\sqcapdot</code>
$\cdot$	<code>\cdot</code>	$\cdotp$	<code>\hcdot</code>	$\sqcapplus$	<code>\sqcapplus</code>
$\cdot$	<code>\cdot</code>	$\sqcupdot$	<code>\intercal</code>	$\sqcup$	<code>\sqcup</code>
$\cdot$	<code>\cdot</code>	$\sqcapdot$	<code>\intprod</code>	$\sqcupdot$	<code>\sqcupdot</code>
$\cdot$	<code>\centerdot</code>	$\sqcupdot$	<code>\intprodr</code>	$\sqcupplus$	<code>\sqcupplus</code>
$\cup$	<code>\cup</code>	$\times$	<code>\leftthreetimes</code>	$\times$	<code>\times</code>
$\sqcupdot$	<code>\cupdot</code>	$\leftarrow$	<code>\leftY</code>	$\times$	<code>\times</code>

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$\cup$	<code>\cupplus</code>	$\ltimes$	<code>\ltimes</code>	$\cdot\cdot$	<code>\udotdot</code>
$\vee$	<code>\curlyvee</code>	$\backslash$	<code>\medbackslash</code>	$\boxtimes$	<code>\upbowtie</code>
$\wedge$	<code>\curlywedge</code>	$\diagup$	<code>\medslash</code>	$\wedge$	<code>\upY</code>
$\ddot{\cdot}$	<code>\ddot{dot}</code>	$-$	<code>\minus</code>	$\boxtimes$	<code>\utimes</code>
$\div$	<code>\div</code>	$\div$	<code>\minusdot</code>	$\boxplus$	<code>\varamalg</code>
$*$	<code>\divideontimes</code>	$\div$	<code>\minusfdots</code>	$:$	<code>\vdotdot</code>
$/$	<code>\divslash</code>	$\div$	<code>\minusrdots</code>	$\vdots$	<code>\vdots</code>
$\dot{-}$	<code>\dotminus</code>	$\mp$		$\vee$	<code>\vee</code>
$+$	<code>\dotplus</code>	$+$	<code>\plus</code>	$\boxvee$	<code>\veebar</code>
$\times$	<code>\dottimes</code>	$+$	<code>\plusdot</code>	$\boxvee$	<code>\veedot</code>
$\bar{\wedge}$	<code>\doublebarwedge</code>	$\pm$	<code>\pm</code>	$\boxvee$	<code>\veedoublebar</code>
$\Cap$	<code>\doublecap</code>	$\sqcup$	<code>\pullback</code>	$\wedge$	<code>\wedge</code>
$\Cup$	<code>\doublecup</code>	$\sqcap$	<code>\pushout</code>	$\wedge$	<code>\wedgedot</code>
$\boxCap$	<code>\doublesqcap</code>	$\times$	<code>\rightthreetimes</code>	$\wr$	<code>\wreath</code>

`fdsymbol` defines `\btimes` as a synonym for `\dtimes`; `\Cap` as a synonym for `\doublecap`; `\Cup` as a synonym for `\doublecup`; `\hookupminus` as a synonym for `\intprod`; `\hourglass` as a synonym for `\upbowtie`; `\land` as a synonym for `\wedge`; `\lor` as a synonym for `\vee`; `\minushookup` as a synonym for `\intprod`; `\smalldivslash` as a synonym for `\medslash`; `\smallsetminus` as a synonym for `\medbackslash`; `\Sqcap` as a synonym for `\doublesqcap`; `\Sqcup` as a synonym for `\doublesqcup`; `\ttimes` as a synonym for `\utimes`; `\lJoin` as a synonym for `\ltimes`; `\rJoin` as a synonym for `\rtimes`; `\Join` and `\lrtimes` as synonyms for `\bowtie`; `\uplus` as a synonym for `\cupplus`; `\veeonvee` as a synonym for `\doublevee`; `\wedgeonwedge` as a synonym for `\doublewedge`; and `\wr` as a synonym for `\wreath`.

TABLE 61: boisik Binary Operators

$*$	<code>\ast</code>	$\times$	<code>\dottimes</code>	$\rtimes$	<code>\rtimesblack</code>
$\phi$	<code>\baro</code>	$\bar{\wedge}$	<code>\doublebarwedge</code>	$\smallsetminus$	<code>\smallsetminus</code>
$\barwedge$	<code>\barwedge</code>	$\mathbin{;}$	<code>\fatsemi</code>	$\boxtimes$	<code>\smashtimes</code>
$\barwedge$	<code>\bbslash</code>	$\mathbin{>}$	<code>\gtrdot</code>	$\boxplus$	<code>\squplus</code>
$\&$	<code>\binampersand</code>	$\top$	<code>\intercal</code>	$\mathbin{\parallel}$	<code>\sslash</code>
$\wp$	<code>\bindnasrepma</code>	$\mathbin{\{} \mathbin{\}}$	<code>\lbag</code>	$\times$	<code>\times</code>
$\blacktriangleleft$	<code>\blackbowtie</code>	$\blacktriangleleft$	<code>\lblackbowtie</code>	$\boxplus$	<code>\uplus</code>
$\bowtie$	<code>\bowtie</code>	$\mathbin{\triangleleft}$	<code>\leftslice</code>	$\cap$	<code>\varcap</code>
$\cap$	<code>\cap</code>	$\mathbin{\lambda}$	<code>\leftthreetimes</code>	$\cup$	<code>\varcup</code>
$\Cap$	<code>\Cap</code>	$\mathbin{<}$	<code>\lessdot</code>	$\top$	<code>\varintercal</code>

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.	\cdot	\cdot	\cdot	\cdot
.	\centerdot	\blacktriangleleft	\blacktriangleright	\sqcap
+	\circplus	\blacktriangleleft	\blacktriangleright	\sqcup
*	\coAsterisk	\minuso	\vee	\vartimes
*	\convolution	\moo	\Vee	\veebar
\cup	\cup	\mp	\wedge	\veeonvee
\Cup	\Cup	\nplus	\wedge	\wedge
\cupleftarrow	\cupleftarrow	\pluscirc	\wedge	\wedge
\curlyvee	\curlyvee	\plustrif	\wedge	\Wedge
\curlywedge	\curlywedge	\pm	\Ydown	\Ydown
\dagger	\dagger	\rbag	\Yleft	\Yleft
\ddagger	\ddagger	\rblackbowtie	\Yright	\Yright
\div	\div	\rightslice	\Yup	\Yup
*	\divideontimes	\rightthreetimes		
+	\dotplus	\rtimes		

TABLE 62: stix Binary Operators

\amalg	;	\fcmp	\sqcup
\ast	/	\fracslash	\Sqcup
\barcap	\top	\intercal	\sslash
\barcup	\parallel	\interleave	\threedotcolon
\barvee	\sqcup	\intprod	\times
\barwedge	\sqcap	\intprodr	\timesbar
\bigslopedvee	\approx	\invlazys	\tminus
\bigslopedwedge	\times	\leftthreetimes	\tplus
\btimes	\triangleleft	\lhd	\tripleplus
\cap	\times	\ltimes	\trslash
\Cap	\forall	\midbarvee	\twocaps
\capbarcup	\wedge	\midbarwedge	\twocups
\capdot	\div	\minusdot	\typecolon
\capovercup	\div	\minusfdots	\uminus
\capwedge	\div	\minusrdots	\unlhd
\closedvarcap	\mp		\unrhd
\closedvarcup	\#	\nhVvert	\upand
\closedvarcupsmashprod	\oplus	\opluslhrim	\uplus
\commaminus	\oplus	\oplusrhrim	\varbarwedge

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$\cup$	<code>\cup</code>	$\otimes$	<code>\otimeslhrim</code>	$\bar{\wedge}$	<code>\vardoublebarwedge</code>
$\Subset$	<code>\Cup</code>	$\otimes$	<code>\otimesrhrim</code>	$\vartriangleleft$	<code>\varveebar</code>
$\supseteq$	<code>\cupbarcap</code>	$\dot{+}$	<code>\plusdot</code>	$\times$	<code>\vectimes</code>
$\supset$	<code>\cupdot</code>	$\doteq$	<code>\pluseqq</code>	$\vee$	<code>\Vee</code>
$\supsetleftarrow$	<code>\cupleftarrow</code>	$\dagger$	<code>\plushat</code>	$\veevee$	<code>\vee</code>
$\supsetcap$	<code>\cupovercap</code>	$\ddot{+}$	<code>\plussim</code>	$\veebar$	<code>\veebar</code>
$\supsetvee$	<code>\cupvee</code>	$\ddot{+}_2$	<code>\plussubtwo</code>	$\veedot$	<code>\veedot</code>
$\supsetcurlyvee$	<code>\curlyvee</code>	$\ddot{*}$	<code>\plustrif</code>	$\veebar$	<code>\veedoublebar</code>
$\supsetcurlywedge$	<code>\curlywedge</code>	$\pm$	<code>\pm</code>	$\veemidvert$	<code>\veemidvert</code>
$\dagger$	<code>\dagger</code>	$\triangleright$	<code>\rhd</code>	$\veeodot$	<code>\veeodot</code>
$\ddagger$	<code>\ddagger</code>	$\wedge$	<code>\rightthreetimes</code>	$\veeonvee$	<code>\veeonvee</code>
$\div$	<code>\div</code>	$\dot{+}$	<code>\ringplus</code>	$\wedge$	<code>\Wedge</code>
$\divideontimes$	<code>\divideontimes</code>	$\dot{\wedge}$	<code>\rsolbar</code>	$\wedge$	<code>\wedge</code>
$\dot{\div}$	<code>\dot{\div}</code>	$\rtimes$	<code>\rtimes</code>	$\wedgebar$	<code>\wedgebar</code>
$\dot{\dot{\div}}$	<code>\dot{\dot{\div}}</code>	$\backslash$	<code>\setminus</code>	$\wedgegedot$	<code>\wedgegedot</code>
$\dot{\dot{\times}}$	<code>\dot{\dot{\times}}</code>	$\sqsubset$	<code>\shuffle</code>	$\wedgegedoublebar$	<code>\wedgegedoublebar</code>
$\dot{\dot{\nabla}}$	<code>\dot{\dot{\nabla}}</code>	$\dot{\sqsubset}$	<code>\simplus</code>	$\wedgemidvert$	<code>\wedgemidvert</code>
$\dot{\dot{\wedge}}$	<code>\dot{\dot{\wedge}}</code>	$\smallsetminus$	<code>\smallsetminus</code>	$\wedgeodot$	<code>\wedgeodot</code>
$\dot{\dot{\oplus}}$	<code>\dot{\dot{\oplus}}</code>	$\ast$	<code>\smashtimes</code>	$\wedgeonwedge$	<code>\wedgeonwedge</code>
$\dot{\dot{\wr}}$	<code>\dot{\dot{\wr}}</code>	$\sqcap$	<code>\sqcap</code>	$\wr$	<code>\wr</code>
$\dot{\dot{\mp}}$	<code>\dot{\dot{\mp}}</code>	$\sqcap$	<code>\Sqcap</code>		

stix defines `\land` as a synonym for `\wedge`, `\lor` as a synonym for `\vee`, `\doublecap` as a synonym for `\Cap`, and `\doublecup` as a synonym for `\Cup`.

TABLE 63: `mathdesign` Binary Operators

$\times$  `\dtimes`    $\times$  `\udtimes`    $\times$  `\utimes`

The `mathdesign` package additionally provides versions of each of the binary operators shown in Table 54.

TABLE 64: `pdfMsym` Binary Operators

$\wedge$	<code>\circlwedge</code>	$\vdash$	<code>\divs</code>	$\curlywedge$	<code>\ndivs</code>
$\cup$	<code>\dcup</code>	$\wedge$	<code>\dwedge</code>		

`pdfMsym` symbols are implemented with PDF literals instead of (or sometimes in conjunction) with a font. All symbols can be rendered by `pdflATEX` and `LuaLATEX`, some by `XELATEX`, and none by most other `TEX` backends.

TABLE 65: `cmll` Binary Operators
 $\wp \quad \backslash\text{parr}^* \quad \& \quad \backslash\text{with}^\dagger$ 

\* `cmll` defines `\invamp` as a synonym for `\parr`.

† `\with` differs from `\&` in terms of its math-mode spacing: `$A \& B$` produces “*A & B*”, for example, while `$A \with B$` produces “*A & B*”.

TABLE 66: `shuffle` Binary Operators
 $\boxplus \quad \backslash\text{cshuffle} \quad \boxminus \quad \backslash\text{shuffle}$ 
TABLE 67: `resmes` Binary Operators
 $\llcorner \quad \backslash\text{resmes}$ 

This symbol notates the restriction of a measure to a set, as in  $\phi \llcorner Y$ .

TABLE 68: `logix` Logical Operators

$\odot$	<code>\CircInvNt</code>	$\oslash$	<code>\CircXor</code>	$\bar{\wedge}$	<code>\Nand</code>	$\wedge$	<code>\SbNd</code>
$\oslash$	<code>\CircNand</code>	$\wedge$	<code>\Dnd</code>	$\wedge$	<code>\Nd</code>	$\vee$	<code>\SbNor</code>
$\oslash$	<code>\CircNd</code>	$\dashv$	<code>\Dnt</code>	$\sim$	<code>\Ngt</code>	$\vee$	<code>\SbOr</code>
$\oslash$	<code>\CircNgt</code>	$\dot{\vee}$	<code>\Dor</code>	$\dot{\nabla}$	<code>\Nor</code>	$\dot{\vee}$	<code>\SbXor</code>
$\oslash$	<code>\CircNor</code>	$\dashv$	<code>\InvNt</code>	$\neg$	<code>\Nt</code>	$\mid$	<code>\Shfr</code>
$\ominus$	<code>\CircNt</code>	$\uparrow$	<code>\Lnand</code>	$\vee$	<code>\Or</code>	$\vee$	<code>\Xor</code>
$\oslash$	<code>\CircOr</code>	$\downarrow$	<code>\Lnor</code>	$\bar{\wedge}$	<code>\SbNand</code>		

`logix` requires either `LuaLaTeX` or `XHLaTeX`.

TABLE 69: `ulsy` Geometric Binary Operators
 $\oplus \quad \backslash\text{odplus}$

TABLE 70: mathabx Geometric Binary Operators

▼	\blacktriangledown	□	\boxright	⊖	\ominus
◀	\blacktriangleleft	□	\boxslash	⊕	\oplus
▶	\blacktriangleright	□	\boxtimes	⊟	\right
▲	\blacktriangleup	□	\boxtop	⊗	\oslash
✳	\boxasterisk	□	\boxtriangleup	⊗	\otimes
▣	\boxbackslash	□	\boxvoid	⊕	\otop
▤	\boxbot	⊗	\oasterisk	⊟	\otriangleup
▢	\boxcirc	⊗	\backslash	○	\void
✳	\boxcoasterisk	⊕	\obot	▽	\smalltriangledown
÷	\boxdiv	◎	\ocirc	◀	\smalltriangleleft
■	\boxdot	⊗	\ocoasterisk	▶	\smalltriangleright
▤	\boxleft	÷	\odiv	△	\smalltriangleup
▢	\boxminus	○	\odot		
▤	\boxplus	⊕	\oleft		

TABLE 71: MnSymbol Geometric Binary Operators

▢	\boxbackslash	▼	\filledmedtriangledown	◎	\ocirc
▣	\boxbox	◀	\filledmedtriangleleft	○	\odot
▤	\boxdot	▶	\filledmedtriangleright	⊖	\ominus
▢	\boxminus	▲	\filledmedtriangleup	⊕	\oplus
▤	\boxplus	■	\filledsquare	⊗	\oslash
▢	\boxslash	★	\filledstar	⊛	\ostar
▢	\boxtimes	▼	\filledtriangledown	⊗	\otimes
▤	\boxvert	◀	\filledtriangleleft	⊟	\triangle
❖	\diamondbackslash	▶	\filledtriangleright	▷	\overline{}
❖	\diamonddiamond	▲	\filledtriangleup	☆	\pentagram
❖	\diamondddot	◇	\meddiamond	◊	\smalldiamond
❖	\diamondminus	□	\medsquare	□	\smallsquare
❖	\diamondplus	☆	\medstar	★	\smallstar
❖	\dslash	▽	\medtriangledown	▽	\smalltriangledown
❖	\dtimes	◀	\medtriangleleft	◀	\smalltriangleleft
❖	\dvert	▶	\medtriangleright	▶	\smalltriangleright
▽	\downslice	△	\medtriangleup	△	\smalltriangleup
◆	\filleddiamond	⊕	\oast	★	\thinstar
■	\filledmedsquare	⊗	\backslash	△	\upslice

MnSymbol defines \blacksquare as a synonym for \filledmedsquare; \square and \Box as synonyms for \medsquare; \diamond as a synonym for \smalldiamond; \Diamond as a synonym for \meddiamond; \star as a synonym for \thinstar; \circledast as a synonym for \oast; \circledcirc as a synonym for \ocirc; and, \circleddash as a synonym for \ominus.

TABLE 72: *fdsymbol* Geometric Binary Operators

□	\boxbackslash	▼	\medblacktriangledown	⊕	\oplus
▣	\boxbox	◀	\medblacktriangleleft	⊖	\oslash
▣	\boxdot	▶	\medblacktriangleright	⊗	\otimes
▣	\boxminus	▲	\medblacktriangleup	∅	\overt
▣	\boxplus	○	\medcircle	●	\smallblackcircle
▣	\boxslash	◇	\meddiamond	◆	\smallblackdiamond
▣	\boxtimes	/	\medslash	■	\smallblacksquare
▣	\boxvert	□	\medsquare	★	\smallblackstar
◊	\diamondbackslash	▽	\medtriangledown	▼	\smallblacktriangledown
◊	\diamonddiamond	◀	\medtriangleleft	◀	\smallblacktriangleleft
◊	\diamonddot	▶	\medtriangleright	▶	\smallblacktriangleright
◊	\diamondminus	△	\medtriangleup	▲	\smallblacktriangleup
◊	\diamondplus	☆	\medwhitestar	○	\smallcircle
◊	\diamondslash	⊗	\oast	◊	\smalldiamond
◊	\diamondtimes	⊗	\obackslash	□	\smallsquare
◊	\diamondvert	◎	\ocirc	▽	\smalltriangledown
●	\medblackcircle	⊖	\odash	◀	\smalltriangleleft
◆	\medblackdiamond	◎	\odot	▶	\smalltriangleright
■	\medblacksquare	⊖	\oequal	△	\smalltriangleup
★	\medblackstar	⊖	\ominus	☆	\smallwhitestar

*fdsymbol* defines synonyms for most of the preceding symbols:

◆	\blackdiamond	◊	\diamond	●	\smblkcircle
▲	\blacktriangle	◊	\Diamond	◆	\smblkdiamond
▼	\blacktriangledown	◊	\diamondbslash	■	\smbblksquare
◀	\blacktriangleleft	◊	\diamondcdot	☆	\smwhitestar
▶	\blacktriangleright	◆	\mdblkdiamond	○	\smwhtcircle
□	\Box	■	\mdblksquare	◊	\smwhtdiamond
■	\boxbar	●	\mdlblkcircle	□	\smwtsquare
▣	\boxbslash	◆	\mdlblkdiamond	□	\square
▣	\boxdiag	■	\mdlblksquare	★	\star
●	\bullet	○	\mdlgwhtcircle	△	\triangle
○	\circ	◊	\mdlgwhtdiamond	▽	\triangledown
⊗	\circledast	□	\mdlgwhtsquare	◀	\triangleleft
◎	\circledcirc	◊	\mdwhtdiamond	▶	\triangleright
⊖	\circleddash	□	\mdwhtsquare	△	\vartriangle
⊖	\circledeq	★	\medstar		
⊖	\circledvert	◎	\obslash		

TABLE 73: boisik Geometric Binary Operators

◆	\blacklozenge	□	\boxright	□	\oblong
■	\blacksquare	□	\boxslash	⊕	\obot
▲	\blacktriangle	⊗	\boxtimes	⊗	\obslash
▼	\blacktriangledown	▣	\boxtop	⊗	\ogreaterthan
◀	\blacktriangleleft	▣	\boxtriangle	⊕	\oleft
▶	\blacktriangleright	⊗	\circledast	⊗	\olessthan
☒	\boxast	◎	\circledcirc	⊖	\ominus
☒	\boxbar	⊖	\circleddash	⊕	\oplus
☒	\boxbot	◊	\diamond	⊕	\oright
☒	\boxbox	◊	\diamondbar	⊗	\oslash
☒	\boxbslash	◊	\diamondcircle	⊗	\otimes
☒	\boxcircle	◊	\diamondminus	⊕	\otop
☒	\boxdivision	◊	\diamondop	◎	\otriangle
☒	\boxdot	◊	\diamondplus	⊗	\ovee
☒	\boxleft	◊	\diamondtimes	⊗	\owedge
☒	\boxminus	◊	\diamondtriangle	*	\star
☒	\boxplus	⊖	\obar	□	\talloblong

TABLE 74: stix Geometric Binary Operators

☒	\blackhourglass	◊	\concavediamondtickleft	⊕	\oplus
☒	\boxast	◊	\concavediamondtickright	⊗	\oslash
☒	\boxbar	◊	\diamond	⊗	\otimes
☒	\boxbox	◁	\dsub	⊗	\otimes
☒	\boxbslash	☒	\hourglass	⊗	\otimeshat
☒	\boxcircle	◊	\lozengeminus	▷	\rsub
☒	\boxdiag	◆	\mdlgblklozenge	•	\smbblkcircle
☒	\boxdot	○	\mdlgwhtcircle	★	\star
☒	\boxminus	∅	\obar	□	\talloblong
☒	\boxplus	⊕	\obot*	△	\triangle
☒	\boxtimes	⊗	\obslash	△	\triangleminus
⊗	\circledast	⊕	\odiv	△	\triangleplus
◎	\circledcirc	◎	\odot	△	\triangleserifs
⊖	\circleddash	⊗	\dotslashdot*	△	\triangletimes
⊖	\circledequal	⊗	\ogreaterthan	•	\vysmbblkcircle†

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$\textcircled{P}$	<code>\circledparallel</code>	$\otimes$	<code>\olcross*</code>	$\circ$	<code>\vysmwhtcircle</code>
$\textcircled{\ominus}$	<code>\circledvert</code>	$\oslash$	<code>\olessthan</code>	$\square$	<code>\whitesquaretickleft</code>
$\textcircled{\ominus}$	<code>\circlehbar</code>	$\ominus$	<code>\ominus</code>	$\square$	<code>\whitesquaretickright</code>
$\textdiamondsuit$	<code>\concavediamond</code>	$\oplus$	<code>\operp</code>		

\* Defined as an ordinary character, not as a binary relation. However, these symbols more closely resemble the other symbols in this table than they do the geometric shapes presented in Table 440, which is why they are included here.

† stix defines `\bullet` as a synonym for `\vysmblkcircle`.

TABLE 75: logix Geometric Binary Operators

$\bullet$	<code>\BlackCircle</code>	$\triangleleft$	<code>\LogPast</code>
$\cdot$	<code>\BlackCircleA</code>	$\diamondleftarrow$	<code>\LogPos</code>
$\bullet$	<code>\BlackCircleB</code>	$\circ$	<code>\LWhiteCircle</code>
$\bullet$	<code>\BlackCircleC</code>	$\diamond$	<code>\LWhiteCurvedDiamond</code>
$\bullet$	<code>\BlackCircleD</code>	$\diamond$	<code>\LWhiteDiamond</code>
$\bullet$	<code>\BlackCircleE</code>	$\triangledown$	<code>\LWhiteDownTriangle</code>
$\bullet$	<code>\BlackCircleF</code>	$\triangleleft$	<code>\LWhiteLeftArrowHead</code>
$\bullet$	<code>\BlackCircleG</code>	$\triangleleft$	<code>\LWhiteLeftTriangle</code>
$\bullet$	<code>\BlackCircleH</code>	$\square$	<code>\LWhiteLozenge</code>
$\bullet$	<code>\BlackCircleI</code>	$\triangleright$	<code>\LWhiteRightArrowHead</code>
$\blacklozenge$	<code>\BlackCurvedDiamond</code>	$\triangleright$	<code>\LWhiteRightCurvedArrowHead</code>
$\blacklozenge$	<code>\BlackDiamond</code>	$\triangleright$	<code>\LWhiteRightTriangle</code>
$\blacklozenge$	<code>\BlackDiamondA</code>	$\circ$	<code>\LWhiteSmallCircle</code>
$\blacklozenge$	<code>\BlackDiamondB</code>	$\square$	<code>\LWhiteSquare</code>
$\blacklozenge$	<code>\BlackDiamondC</code>	$\square$	<code>\LWhiteSquareRoundCorners</code>
$\blacklozenge$	<code>\BlackDiamondD</code>	$\triangleup$	<code>\LWhiteUpTriangle</code>
$\blacklozenge$	<code>\BlackDiamondE</code>	$\circ$	<code>\LWhiteVerySmallCircle</code>
$\blacklozenge$	<code>\BlackDiamondF</code>	$\square$	<code>\LWhiteVerySmallSquare</code>
$\blacklozenge$	<code>\BlackDiamondG</code>	$\blacksquare$	<code>\Nec</code>
$\blacklozenge$	<code>\BlackDiamondH</code>	$\bullet$	<code>\Next</code>
$\blacklozenge$	<code>\BlackDiamondI</code>	$\blacktriangle$	<code>\NonCont</code>
$\blacktriangledown$	<code>\BlackDownTriangle</code>	$\circ$	<code>\OutlineCircle</code>
$\blacktriangledown$	<code>\BlackDownTriangleA</code>	$\diamond$	<code>\OutlineCurvedDiamond</code>
$\blacktriangledown$	<code>\BlackDownTriangleB</code>	$\diamond$	<code>\OutlineDiamond</code>
$\blacktriangledown$	<code>\BlackDownTriangleC</code>	$\triangledown$	<code>\OutlineDownTriangle</code>
$\blacktriangledown$	<code>\BlackDownTriangleD</code>	$\triangleleft$	<code>\OutlineLeftArrowHead</code>

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▼	\BlackDownTriangleE	◀	\OutlineLeftTriangle
▼	\BlackDownTriangleF	▣	\OutlineLozenge
▼	\BlackDownTriangleG	▶	\OutlineRightArrowHead
▼	\BlackDownTriangleH	▷	\OutlineRightCurvedArrowHead
▼	\BlackDownTriangleI	▷	\OutlineRightTriangle
◀	\BlackLeftArrowHead	○	\OutlineSmallCircle
◀	\BlackLeftTriangle	□	\OutlineSquare
·	\BlackLeftTriangleA	□	\OutlineSquareRoundCorners
·	\BlackLeftTriangleB	△	\OutlineUpTriangle
·	\BlackLeftTriangleC	○	\OutlineVerySmallCircle
·	\BlackLeftTriangleD	□	\OutlineVerySmallSquare
◀	\BlackLeftTriangleE	◀	\Past
◀	\BlackLeftTriangleF	◆	\Pos
◀	\BlackLeftTriangleG	▣	\QuartedLozenge
◀	\BlackLeftTriangleH	⊕	\QuarteredCircle
◀	\BlackLeftTriangleI	♦	\QuarteredCurvedDiamond
■	\BlackLozenge	♦	\QuarteredDiamond
·	\BlackReallySmallCircle	▽	\QuarteredDownTriangle
◆	\BlackReallySmallDiamond	◀	\QuarteredLeftTriangle
▪	\BlackReallySmallSquare	▷	\QuarteredRightTriangle
▶	\BlackRightArrowHead	⊕	\QuarteredSmallCircle
▶	\BlackRightCurvedArrowHead	■	\QuarteredSquare
▶	\BlackRightTriangle	⊕	\QuarteredSquareRoundCorners
·	\BlackRightTriangleA	▲	\QuarteredUpTriangle
·	\BlackRightTriangleB	●	\QuarteredVerySmallCircle
▶	\BlackRightTriangleC	■	\QuarteredVerySmallSquare
▶	\BlackRightTriangleD	▽	\TmpCont
▶	\BlackRightTriangleE	▷	\TmpFutr
▶	\BlackRightTriangleF	■	\TmpNec
▶	\BlackRightTriangleG	⊖	\TmpNext
▶	\BlackRightTriangleH	△	\TmpNonCont
▶	\BlackRightTriangleI	◀	\TmpPast
●	\BlackSmallCircle	◊	\TmpPos
■	\BlackSquare	□	\UpSlashedSquareRoundCorners
·	\BlackSquareA	○	\UpSlashedCircle
▪	\BlackSquareB	♦	\UpSlashedCurvedDiamond
■	\BlackSquareC	◊	\UpSlashedDiamond
■	\BlackSquareD	▽	\UpSlashedDownTriangle
■	\BlackSquareE	◀	\UpSlashedLeftTriangle
■	\BlackSquareF	■	\UpSlashedLozenge
■	\BlackSquareG	▷	\UpSlashedRightTriangle
■	\BlackSquareH	○	\UpSlashedSmallCircle
■	\BlackSquareI	□	\UpSlashedSquare
■	\BlackSquareRoundCorners	△	\UpSlashedUpTriangle

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▲	\BlackUpTriangle	○	\UpSlashedVerySmallCircle
▲	\BlackUpTriangleA	□	\UpSlashedVerySmallSquare
▲	\BlackUpTriangleB	○	\VerticallyDividedCircle
▲	\BlackUpTriangleC	◊	\VerticallyDividedCurvedDiamond
▲	\BlackUpTriangleD	◊	\VerticallyDividedDiamond
▲	\BlackUpTriangleE	▽	\VerticallyDividedDownTriangle
▲	\BlackUpTriangleF	◀	\VerticallyDividedLeftTriangle
▲	\BlackUpTriangleG	■	\VerticallyDividedLozenge
▲	\BlackUpTriangleH	▷	\VerticallyDividedRightTriangle
▲	\BlackUpTriangleI	○	\VerticallyDividedSmallCircle
●	\BlackVerySmallCircle	□	\VerticallyDividedSquare
■	\BlackVerySmallSquare	○	\VerticallyDividedSquareRoundCorners
▼	\Cont	△	\VerticallyDividedUpTriangle
⊗	\CrossedCircle	○	\VerticallyDividedVerySmallCircle
❖	\CrossedCurvedDiamond	□	\VerticallyDividedVerySmallSquare
❖	\CrossedDiamond	○	\WhiteCircle
▽	\CrossedDownTriangle	○	\WhiteCircleA
◀	\CrossedLeftTriangle	○	\WhiteCircleB
■	\CrossedLozenge	○	\WhiteCircleC
▷	\CrossedRightTriangle	○	\WhiteCircleContainingBlackCircle
⊗	\CrossedSmallCircle	○	\WhiteCircleD
■	\CrossedSquare	○	\WhiteCircleE
⊗	\CrossedSquareRoundCorners	○	\WhiteCircleF
▲	\CrossedUpTriangle	○	\WhiteCircleG
○	\CrossedVerySmallCircle	○	\WhiteCircleH
□	\CrossedVerySmallSquare	○	\WhiteCircleI
▽	\DeoCont	◊	\WhiteCurvedDiamond
▷	\DeoFutr	❖	\WhiteCurvedDiamondContainingBlackDiamond
□	\DeoNec	◊	\WhiteDiamond
○	\DeoNext	◦	\WhiteDiamondA
△	\DeoNonCont	◦	\WhiteDiamondB
◀	\DeoPast	◦	\WhiteDiamondC
❖	\DeoPos	❖	\WhiteDiamondContainingBlackDiamond
○	\DottedCircl	◊	\WhiteDiamondD
❖	\DottedCurvedDiamond	◊	\WhiteDiamondE
❖	\DottedDiamond	◊	\WhiteDiamondF
▽	\DottedDownTriangle	◊	\WhiteDiamondG
◀	\DottedLeftArrowHead	◊	\WhiteDiamondH
◀	\DottedLeftTriangle	◊	\WhiteDiamondI
■	\DottedLozenge	▽	\WhiteDownTriangle
▷	\DottedRightArrowHead	▼	\WhiteDownTriangleA
▷	\DottedRightCurvedArrowHead	▼	\WhiteDownTriangleB
▷	\DottedRightTriangle	▼	\WhiteDownTriangleC
○	\DottedSmallCircle	▼	\WhiteDownTriangleContainingBlackDownTriangle

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□	\DottedSquare	▽	\WhiteDownTriangleD
○	\DottedSquareRoundCorners	▽	\WhiteDownTriangleE
△	\DottedUpTriangle	▽	\WhiteDownTriangleF
◦	\DottedVerySmallCircle	▽	\WhiteDownTriangleG
▣	\DottedVerySmallSquare	▽	\WhiteDownTriangleH
○	\DownSlashedCircle	▽	\WhiteDownTriangleI
◊	\DownSlashedCurvedDiamond	◀	\WhiteLeftArrowHead
◊	\DownSlashedDiamond	◀	\WhiteLeftTriangle
▽	\DownSlashedDownTriangle	▲	\WhiteLeftTriangleA
◀	\DownSlashedLeftTriangle	▲	\WhiteLeftTriangleB
▣	\DownSlashedLozenge	▲	\WhiteLeftTriangleC
▷	\DownSlashedRightTriangle	◀	\WhiteLeftTriangleContainingBlackLeftTriangle
○	\DownSlashedSmallCircle	◀	\WhiteLeftTriangleD
▣	\DownSlashedSquare	◀	\WhiteLeftTriangleE
○	\DownSlashedSquareRoundCorners	◀	\WhiteLeftTriangleF
△	\DownSlashedUpTriangle	◀	\WhiteLeftTriangleG
◦	\DownSlashedVerySmallCircle	◀	\WhiteLeftTriangleH
▣	\DownSlashedVerySmallSquare	◀	\WhiteLeftTriangleI
▽	\DoxCont	□	\WhiteLozenge
▷	\DoxFutr	■	\WhiteLozengeContainingBlackLozenge
▣	\DoxNec	○	\WhiteReallySmallCircle
○	\DoxNext	◊	\WhiteReallySmallDiamond
△	\DoxNonCont	□	\WhiteReallySmallSquare
◀	\DoxPast	▷	\WhiteRightArrowHead
◊	\DoxPos	▷	\WhiteRightCurvedArrowHead
▽	\FacCont	▷	\WhiteRightTriangle
▷	\FacFutr	▶	\WhiteRightTriangleA
□	\FacNec	▶	\WhiteRightTriangleB
○	\FacNext	▶	\WhiteRightTriangleC
△	\FacNonCont	▷	\WhiteRightTriangleContainingBlackRightTriangle
◀	\FacPast	▷	\WhiteRightTriangleD
◊	\FacPos	▷	\WhiteRightTriangleE
▶	\Futr	▷	\WhiteRightTriangleF
⊖	\HorizontallyDividedCircle	▷	\WhiteRightTriangleG
◊	\HorizontallyDividedCurvedDiamond	▷	\WhiteRightTriangleH
◊	\HorizontallyDividedDiamond	▷	\WhiteRightTriangleI
▽	\HorizontallyDividedDownTriangle	○	\WhiteSmallCircle
◀	\HorizontallyDividedLeftTriangle	○	\WhiteSmallCircleContainingBlackCircle
▣	\HorizontallyDividedLozenge	□	\WhiteSquare
▷	\HorizontallyDividedRightTriangle	□	\WhiteSquareA
⊖	\HorizontallyDividedSmallCircle	□	\WhiteSquareB
▣	\HorizontallyDividedSquare	□	\WhiteSquareC
⊖	\HorizontallyDividedSquareRoundCorners	□	\WhiteSquareContainingBlackSquare
△	\HorizontallyDividedUpTriangle	□	\WhiteSquareD

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◦	\HorizontallyDividedVerySmallCircle	□	\WhiteSquareE
▣	\HorizontallyDividedVerySmallSquare	□	\WhiteSquareF
●	\LBlackCircle	□	\WhiteSquareG
◆	\LBlackCurvedDiamond	□	\WhiteSquareH
◆	\LBlackDiamond	□	\WhiteSquareI
▼	\LBlackDownTriangle	□	\WhiteSquareRoundCorners
◀	\LBlackLeftArrowHead	□	\WhiteSquareRoundCornersContainingBlackSquare
◀	\LBlackLeftTriangle	△	\WhiteUpTriangle
■	\LBlackLozenge	^	\WhiteUpTriangleA
▶	\LBlackRightArrowHead	^	\WhiteUpTriangleB
▶	\LBlackRightCurvedArrowHead	^	\WhiteUpTriangleC
▶	\LBlackRightTriangle	^	\WhiteUpTriangleContainingBlackUpTriangle
●	\LBlackSmallCircle	△	\WhiteUpTriangleD
■	\LBlackSquare	△	\WhiteUpTriangleE
■	\LBlackSquareRoundCorners	△	\WhiteUpTriangleF
▲	\LBlackUpTriangle	△	\WhiteUpTriangleG
●	\LBlackVerySmallCircle	△	\WhiteUpTriangleH
■	\LBlackVerySmallSquare	△	\WhiteUpTriangleI
▽	\LogCont	○	\WhiteVerySmallCircle
▷	\LogFutr	○	\WhiteVerySmallCircleContainingBlackCircle
□	\LogNec	□	\WhiteVerySmallSquare
○	\LogNext	□	\WhiteVerySmallSquareContainingBlackSquare
△	\LogNonCont		

logix requires either  $\text{\LaTeX}$  or  $\text{\XeLaTeX}$ .

TABLE 76: halloweenmath Halloween-Themed Math Operators

🎃	\bigpumpkin <sup>†</sup>	👻	\mathleftghost	☁️	\reversemathcloud
💀	\bigskull	🦇	\mathrightbat	🧙	\reversemathwitch <sup>†</sup>
🦇	\mathbat	👤	\mathrightghost	🧙*	\reversemathwitch* <sup>†</sup>
☁️	\mathcloud	🧙*	\mathwitch* <sup>†</sup>	💀	\skull
👻	\mathghost	🧙	\mathwitch <sup>†</sup>		
🦇	\mathleftbat	🎃	\pumpkin		

<sup>†</sup> These symbols accept limits. For example,  $\mathwitch_{\{i=0\}}^{\{\infty\}} f(x)$  produces “ $\sum_{i=0}^{\infty} f(x)$ ” in text mode and

$$\sum_{i=0}^{\infty} \mathwitch f(x)$$

in display mode.

<sup>‡</sup>  $\text{\greatpumpkin}$  is a synonym for  $\text{\bigpumpkin}$ .

TABLE 77: stix Small Integrals

$\int$	<code>\smallawint</code>	$\oint$	<code>\smallintcap</code>	$\oint$	<code>\smalloint</code>
$\int$	<code>\smallcirlfnint</code>	$\oint$	<code>\smallintclockwise</code>	$\oint$	<code>\smallointctrcclockwise</code>
$\int$	<code>\smallfint</code>	$\oint$	<code>\smallintcup</code>	$\oint$	<code>\smallpointint</code>
$\iiint$	<code>\smalliiiiint</code>	$\oint$	<code>\smallintlarhk</code>	$\oint$	<code>\smallrppoint</code>
$\iiint$	<code>\smalliiint</code>	$\oint$	<code>\smallintx</code>	$\oint$	<code>\smallscpolint</code>
$\iint$	<code>\smalliint</code>	$\int$	<code>\smalllowint</code>	$\oint$	<code>\smallsqint</code>
$\int$	<code>\smallint</code>	$\oint$	<code>\smallnpoint</code>	$\oint$	<code>\smallsumint</code>
$\int$	<code>\smallintbar</code>	$\iiint$	<code>\smalloiint</code>	$\iint$	<code>\smallupint</code>
$\int$	<code>\smallintBar</code>	$\iiint$	<code>\smalloint</code>	$\oint$	<code>\smallvarointclockwise</code>

By default, each of the preceding commands points to a slanted version of the glyph, as shown. The `upint` package option typesets each integral instead as an upright version. Slanted and upright integrals can be mixed, however, by explicitly using the commands shown in Table 78.

TABLE 78: stix Small Integrals with Explicit Slant

$\int$	<code>\smallawintsl</code>	$\oint$	<code>\smallawintup</code>
$\int$	<code>\smallcirlfnintsl</code>	$\oint$	<code>\smallcirlfnintup</code>
$\int$	<code>\smallfintsl</code>	$\oint$	<code>\smallfintup</code>
$\iiint$	<code>\smalliiiiintsl</code>	$\iiint$	<code>\smalliiiiintup</code>
$\iiint$	<code>\smalliiintsl</code>	$\iiint$	<code>\smalliiintup</code>
$\iint$	<code>\smalliintsl</code>	$\iint$	<code>\smalliintup</code>
$\int$	<code>\smallintbarsl</code>	$\int$	<code>\smallintBarup</code>
$\int$	<code>\smallintBarsl</code>	$\int$	<code>\smallintbarup</code>
$\int$	<code>\smallintcapsl</code>	$\oint$	<code>\smallintcapup</code>
$\int$	<code>\smallintclockwisesl</code>	$\oint$	<code>\smallintclockwiseup</code>
$\oint$	<code>\smallintcupsl</code>	$\oint$	<code>\smallintcupup</code>
$\oint$	<code>\smallintlarhksl</code>	$\oint$	<code>\smallintlarhkup</code>
$\int$	<code>\smallintsł</code>	$\int$	<code>\smallintup</code>
$\oint$	<code>\smallintxsl</code>	$\oint$	<code>\smallintxup</code>
$\iint$	<code>\smalllowintsl</code>	$\iint$	<code>\smalllowintup</code>
$\oint$	<code>\smallnpointsl</code>	$\oint$	<code>\smallnointup</code>
$\iiint$	<code>\smalloiintsl</code>	$\iiint$	<code>\smalloiintup</code>
$\iiint$	<code>\smallointsl</code>	$\iiint$	<code>\smallointup</code>
$\oint$	<code>\smallointctrcclockwisesl</code>	$\oint$	<code>\smallointctrcclockwiseup</code>
$\oint$	<code>\smallointsl</code>	$\oint$	<code>\smallointup</code>
$\oint$	<code>\smallpointintsl</code>	$\oint$	<code>\smallpointintup</code>
$\oint$	<code>\smallrppointsl</code>	$\oint$	<code>\smallrppointup</code>
$\oint$	<code>\smallscpolintsl</code>	$\oint$	<code>\smallscpolintup</code>

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$\oint$	<code>\smallsqintsl</code>	$\oint$	<code>\smallsqintup</code>
$\oint$	<code>\smallsumintsl</code>	$\oint$	<code>\smallsumintup</code>
$\int$	<code>\smallupintsl</code>	$\int$	<code>\smallupintup</code>
$\oint$	<code>\smallvarointclockwise</code>	$\oint$	<code>\smallvarointclockwiseup</code>

Instead of using the preceding symbols directly, it is generally preferable to use the symbols listed in Table 77 either with or without the `upint` package option. Specifying `upint` selects each integral's upright (`up`) variant, while omitting `upint` selects each integral's slanted (`s1`) variant. Use the symbols shown in Table 78 only when you need to include both upright and slanted variations of a symbol in the same document.

TABLE 79: Variable-sized Math Operators

$\cap \cup$	<code>\bigcap \bigcup</code>	$\otimes \otimes$	<code>\bigotimes</code>	$\wedge \wedge$	<code>\bigwedge</code>	$\prod \prod$	<code>\prod</code>
$\cup \cup$	<code>\bigcup</code>	$\sqcup \sqcup$	<code>\bigsqcup</code>	$\coprod \coprod$	<code>\coprod</code>	$\sum \sum$	<code>\sum</code>
$\odot \odot$	<code>\bigodot</code>	$\uplus \uplus$	<code>\biguplus</code>	$\int \int$	<code>\int</code>		
$\oplus \oplus$	<code>\bigoplus</code>	$\vee \vee$	<code>\bigvee</code>	$\oint \oint$	<code>\oint</code>		

TABLE 80: *AMS* Variable-sized Math Operators

$\iint$	$\iint$	$\iiint$	$\iiint$	$\iiint$	$\iiint$
$\iiint$	$\iiint$	$\iiiiint$	$\iiiiint$	$\dots \int \dots \int$	$\idotsint$

TABLE 81: *stmaryrd* Variable-sized Math Operators

$\square \square$	<code>\bigbox</code>	$\parallel \parallel$	<code>\biginterleave</code>	$\square \square$	<code>\bigsqcap</code>
$\curlyvee \curlyvee$	<code>\bigcurlyvee</code>	$\oplus \oplus$	<code>\bignplus</code>	$\nabla \nabla$	<code>\bigtriangledown</code>
$\curlywedge \curlywedge$	<code>\bigcurlywedge</code>	$\parallel \parallel$	<code>\bigparallel</code>	$\Delta \Delta$	<code>\bigtriangleup</code>

TABLE 82: `wasysym` Variable-sized Math Operators

$\int \int \ \backslash \text{int}$	$\iint \iint \ \backslash \text{iint}$	$\iiint \iiint \ \backslash \text{iiint}$
$\oint \oint \ \backslash \text{oint}$	$\oint \oint \ \backslash \text{oint}$	

If `wasysym` is loaded without package options then none of the preceding symbols are defined. However, `\varint` produces `wasysym`'s `\int` glyph, and `\varoint` produces `wasysym`'s `\oint` glyph.

If `wasysym` is loaded with the `integrals` option then all of the preceding symbols are defined, but `\varint` and `\varoint` are left undefined.

If `wasysym` is loaded with the `nointegrals` option then none of the preceding symbols, `\varint`, or `\varoint` are defined.

TABLE 83: `mathabx` Variable-sized Math Operators

$\curlyvee \curlyvee \ \backslash \text{bigcurlyvee}$	$\boxslash \boxslash \ \backslash \text{bigboxslash}$	$\oplus \oplus \ \backslash \text{bigoright}$
$\sqcap \sqcap \ \backslash \text{bigsqcap}$	$\boxtimes \boxtimes \ \backslash \text{bigboxtimes}$	$\oslash \oslash \ \backslash \text{bigoslash}$
$\wedge \wedge \ \backslash \text{bigcurlywedge}$	$\boxdot \boxdot \ \backslash \text{bigboxtop}$	$\ominus \ominus \ \backslash \text{bigotop}$
$\boxast \boxast \ \backslash \text{bigboxasterisk}$	$\triangleleft \triangleleft \ \backslash \text{bigboxtriangleup}$	$\circlearrowleft \circlearrowleft \ \backslash \text{bigotriangleup}$
$\boxbackslash \boxbackslash \ \backslash \text{bigboxbackslash}$	$\square \square \ \backslash \text{bigboxvoid}$	$\bigcirc \bigcirc \ \backslash \text{bigovoid}$
$\boxdot \boxdot \ \backslash \text{bigboxbot}$	$\complement \complement \ \backslash \text{bigcomplementop}$	$\bigplus \bigplus \ \backslash \text{bigplus}$
$\boxcirc \boxcirc \ \backslash \text{bigboxcirc}$	$\boxast \boxast \ \backslash \text{bigoasterisk}$	$\biguplus \biguplus \ \backslash \text{bigsquplus}$
$\boxast \boxast \ \backslash \text{bigboxcoasterisk}$	$\oslash \oslash \ \backslash \text{bigobackslash}$	$\times \times \ \backslash \text{bigtimes}$

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$\boxed{\cdot}$	$\boxed{+}$	$\backslash\bigboxdiv$	$\bigodot \bigoplus$	$\backslashbigobot$	$\iiint$	$\backslashiiint$
$\bullet$	$\square$	$\backslash\bigboxdot$	$\circledcirc$	$\backslashbigocirc$	$\iint$	$\backslashiint$
$\boxminus$	$\boxplus$	$\backslash\bigboxleft$	$\circledast \circledast$	$\backslashbigocoasterisk$	$\int \int$	$\backslashint$
$\boxminus$	$\boxminus$	$\backslash\bigboxminus$	$\div \div$	$\backslashbigodiv$	$\oint \oint$	$\backslashoiint$
$\boxplus$	$\boxplus$	$\backslash\bigboxplus$	$\bigoplus \bigodot$	$\backslashbigoleft$	$\oint \oint$	$\backslashoint$
$\boxminus$	$\boxplus$	$\backslash\bigboxright$	$\ominus \bigodot$	$\backslashbigominus$		

TABLE 84: `txfonts/pxfonts` Variable-sized Math Operators

$\sqcap$	$\sqcup$	$\backslashbigsqcapplus$	$\oint$	$\oint$	$\backslashointclockwise$
$\sqcup$	$\sqcap$	$\backslashbigsqcupplus$	$\oint$	$\oint$	$\backslashointctrcclockwise$
$f$	$f$	$\backslashfint$	$\iiint$	$\iiint$	$\backslashsqiint$
$\int \cdots \int$	$\int \cdots \int$	$\backslashidotsint$	$\iiint$	$\iiint$	$\backslashsqiint$
$\iiint$	$\iiint$	$\backslashiiiint$	$\oint$	$\oint$	$\backslashsqint$
$\iiint$	$\iiint$	$\backslashiiint$	$\iiint$	$\iiint$	$\backslashvaroiintclockwise$

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$\iint$	$\iint$	<code>\iint</code>	$\oint\oint$	$\oint\oint\oint$	<code>\varoiintctrcclockwise</code>
$\oint\oint$	$\oint\oint\oint$	<code>\oiintclockwise</code>	$\oint\oint$	$\oint\oint\oint$	<code>\varoiintclockwise</code>
$\oint\oint$	$\oint\oint\oint$	<code>\oiintctrcclockwise</code>	$\oint\oint$	$\oint\oint\oint$	<code>\varoiintctrcclockwise</code>
$\oint\oint$	$\oint\oint\oint$	<code>\oiint</code>	$\oint$	$\oint$	<code>\varointclockwise</code>
$\oint$	$\oint\oint$	<code>\oiintclockwise</code>	$\oint$	$\oint$	<code>\varointctrcclockwise</code>
$\oint$	$\oint\oint$	<code>\oiintctrcclockwise</code>	$\times$	$\times$	<code>\varprod</code>
$\oint$	$\oint\oint$	<code>\oiint</code>			

TABLE 85: esint Variable-sized Math Operators

$\dots\int$	$\int\dots\int$	<code>\dots\int</code>	$\oint$	$\oint\oint$	<code>\ointclockwise</code>
$f$	$f$	<code>\fint</code>	$\oint$	$\oint\oint$	<code>\ointctrcclockwise</code>
$\iiint$	$\iiint$	<code>\iiint</code>	$\oint\oint$	$\oint\oint\oint$	<code>\sqaint</code>
$\iiint$	$\iiint$	<code>\iiint</code>	$\oint$	$\oint\oint$	<code>\sqaint</code>
$\iint$	$\iint$	<code>\iint</code>	$\oint\oint$	$\oint\oint\oint$	<code>\varoiint</code>
$f$	$f$	<code>\landdownint</code>	$\oint$	$\oint\oint$	<code>\varointclockwise</code>
$f$	$f$	<code>\landupint</code>	$\oint$	$\oint\oint$	<code>\varointctrcclockwise</code>
$\oint$	$\oint\oint$	<code>\oint</code>			

TABLE 86: `bigints` Variable-sized Math Operators

$\int$	$\int$	<code>\bigint</code>	$\oint$	$\oint$	<code>\bigoint</code>
$\int$	$\int$	<code>\bigints</code>	$\oint$	$\oint$	<code>\bigoints</code>
$\int$	$\int$	<code>\bigintss</code>	$\oint$	$\oint$	<code>\bigintss</code>
$\int$	$\int$	<code>\bigintsss</code>	$\oint$	$\oint$	<code>\bigintsss</code>
$\int$	$\int$	<code>\bigintssss</code>	$\oint$	$\oint$	<code>\bigintssss</code>

TABLE 87: `MnSymbol` Variable-sized Math Operators

$\cap$	$\cap$	<code>\bigcap</code>	$\ominus$	$\ominus$	<code>\bigominus</code>	$\complement$	$\complement$	<code>\complement</code>
$\capdot$	$\capdot$	<code>\bigcapdot</code>	$\oplus$	$\oplus$	<code>\bigoplus</code>	$\coprod$	$\coprod$	<code>\coprod</code>
$\capplus$	$\capplus$	<code>\bigcapplus</code>	$\oslash$	$\oslash$	<code>\bigoslash</code>	$\cdots\int$	$\cdots\int$	<code>\idotsint</code>
$\circlearrowleft$	$\circlearrowleft$	<code>\bigcircle</code>	$\otimes$	$\otimes$	<code>\bigostar</code>	$\iiint$	$\iiint$	<code>\iiint</code>
$\cup$	$\cup$	<code>\bigcup</code>	$\otimes$	$\otimes$	<code>\bigotimes</code>	$\iiint$	$\iiint$	<code>\iiint</code>
$\cupdot$	$\cupdot$	<code>\bigcupdot</code>	$\triangleleft$	$\triangleleft$	<code>\bigotriangle</code>	$\iint$	$\iint$	<code>\iint</code>
$\cupplus$	$\cupplus$	<code>\bigcupplus*</code>	$\circledcirc$	$\circledcirc$	<code>\bigovert</code>	$\int$	$\int$	<code>\int</code>
$\curlyvee$	$\curlyvee$	<code>\bigcurlyvee</code>	$+$	$+$	<code>\bigplus</code>	$\int$	$\int$	<code>\landdownint</code>
$\curlyveedot$	$\curlyveedot$	<code>\bigcurlyveedot</code>	$\sqcap$	$\sqcap$	<code>\bigsqcap</code>	$\int$	$\int$	<code>\landupint</code>
$\curlywedge$	$\curlywedge$	<code>\bigcurlywedge</code>	$\sqcapdot$	$\sqcapdot$	<code>\bigsqcapdot</code>	$\oint$	$\oint$	<code>\lcircleleftint</code>
$\curlywedgedot$	$\curlywedgedot$	<code>\bigcurlywedgedot</code>	$\sqcapplus$	$\sqcapplus$	<code>\bigsqcapplus</code>	$\oint$	$\oint$	<code>\lcirclerightint</code>

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$\mathbb{Y}$	$\mathbb{Y}$	<code>\bigdoublecurlyvee</code>	$\sqcup$	$\sqcup$	<code>\bigsqcup</code>	$\oint$	$\oint$	<code>\oiint</code>
$\mathbb{A}$	$\mathbb{A}$	<code>\bigdoublecurlywedge</code>	$\sqcup$	$\sqcup$	<code>\bigsqcupdot</code>	$\oint$	$\oint$	<code>\oint</code>
$\mathbb{V}$	$\mathbb{V}$	<code>\bigdoublevee</code>	$\sqcup$	$\sqcup$	<code>\bigsqcupplus</code>	$\prod$	$\prod$	<code>\prod</code>
$\mathbb{A}$	$\mathbb{A}$	<code>\bigdoublewedge</code>	$\times$	$\times$	<code>\bigtimes</code>	$\oint$	$\oint$	<code>\rcircleleftint</code>
$\otimes$	$\otimes$	<code>\bigoast</code>	$\vee$	$\vee$	<code>\bigvee</code>	$\oint$	$\oint$	<code>\rcirclerightint</code>
$\oslash$	$\oslash$	<code>\bigobackslash</code>	$\forall$	$\forall$	<code>\bigveedot</code>	$\mathcal{f}$	$\mathcal{f}$	<code>\strokedint</code>
$\odot$	$\odot$	<code>\bigocirc</code>	$\wedge$	$\wedge$	<code>\bigwedge</code>	$\sum$	$\sum$	<code>\sum</code>
$\odot$	$\odot$	<code>\bigodot</code>	$\wedge$	$\wedge$	<code>\bigwedgedot</code>	$\oint$	$\oint$	<code>\sumint</code>

\* MnSymbol defines `\biguplus` as a synonym for `\bigcupplus`.

TABLE 88: `fdsymbol` Variable-sized Math Operators

$\cap$	$\cap$	<code>\bigcap</code>	$\sqcup$	$\sqcup$	<code>\bigsqcup</code>	$\oint$	$\oint$	<code>\landupint</code>
$\capdot$	$\capdot$	<code>\bigcapdot</code>	$\sqcup$	$\sqcup$	<code>\bigsqcupdot</code>	$\oint$	$\oint$	<code>\lcircleleftint</code>
$\capplus$	$\capplus$	<code>\bigcapplus</code>	$\sqcup$	$\sqcup$	<code>\bigsqcupplus</code>	$\oint$	$\oint$	<code>\lcirclerightint</code>
$\cup$	$\cup$	<code>\bigcup</code>	$\times$	$\times$	<code>\bigtimes</code>	$\oint\oint$	$\oint\oint$	<code>\oiint</code>
$\cupdot$	$\cupdot$	<code>\bigcupdot</code>	$\vee$	$\vee$	<code>\bigvee</code>	$\oint$	$\oint$	<code>\oiint</code>
$\cupplus$	$\cupplus$	<code>\bigcupplus</code>	$\forall$	$\forall$	<code>\bigveedot</code>	$\oint$	$\oint$	<code>\oint</code>
$\mathcal{Y}$	$\mathcal{Y}$	<code>\bigcurlyvee</code>	$\wedge$	$\wedge$	<code>\bigwedge</code>	$\sum$	$\sum$	<code>\osum</code>
$\curlywedge$	$\curlywedge$	<code>\bigcurlywedge</code>	$\wedge$	$\wedge$	<code>\bigwedgedot</code>	$\prod$	$\prod$	<code>\prod</code>
$\mathbb{W}$	$\mathbb{W}$	<code>\bigdoublevee</code>	$\sqcup$	$\sqcup$	<code>\coprod</code>	$\oint$	$\oint$	<code>\rcircleleftint</code>

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$\wedge \wedge$	$\backslash \text{bigdoublewedge}$	$\int \int$	$\backslash \text{fint}$	$\oint \oint$	$\backslash \text{rcirclerightint}$
$\otimes \otimes$	$\backslash \text{bigoast}$	$\int \dots \int$	$\backslash \text{idotsint}$	$\sum \sum$	$\backslash \text{sum}$
$\odot \odot$	$\backslash \text{bigodot}$	$\iiint \iiint$	$\backslash \text{iiiint}$	$\oint \oint$	$\backslash \text{sumint}$
$\oplus \oplus$	$\backslash \text{bigoplus}$	$\iiii \iiii$	$\backslash \text{iiint}$	$\coprod \coprod$	$\backslash \text{varcoprod}$
$\otimes \otimes$	$\backslash \text{bigotimes}$	$\iint \iint$	$\backslash \text{iint}$	$\sum \sum$	$\backslash \text{varosum}$
$+$	$\backslash \text{bigplus}$	$\int \int$	$\backslash \text{int}$	$\prod \prod$	$\backslash \text{varprod}$
$\sqcap \sqcap$	$\backslash \text{bigsqcap}$	$\int \int$	$\backslash \text{intbar}$	$\sum \sum$	$\backslash \text{varsom}$
$\sqcdot \sqcdot$	$\backslash \text{bigsqcapdot}$	$\int \int$	$\backslash \text{intBar}$	$\oint \oint$	$\backslash \text{varsumint}$
$\sqcup \sqcup$	$\backslash \text{bigsqcapplus}$	$\int \int$	$\backslash \text{landdownint}$		

\* `fdsymbol` defines `\awint` as a synonym for `\landdownint`, `\biguplus` as a synonym for `\bigcupplus`, `\conjquant` as a synonym for `\bigdoublewedge`, `\disjquant` as a synonym for `\bigdoublevee`, `\dotsint` as a synonym for `\idotsint`, `\intclockwise` as a synonym for `\landupint`, `\intctrcclockwise` as a synonym for `\landdownint`, `\modtwosum` as a synonym for `\osum`, `\ointclockwise` as a synonym for `\lcircleleftint`, `\ointctrcclockwise` as a synonym for `\rcirclerightint`, `\varmodtwosum` as a synonym for `\varosum`, `\varointclockwise` as a synonym for `\lcirclerightint`, and `\varointctrcclockwise` as a synonym for `\rcircleleftint`.

TABLE 89: `boisik` Variable-sized Math Operators

$$\int \int \backslash \text{intup}$$

`boisik` additionally provides all of the symbols in Table 79.

TABLE 90: stix Variable-sized Math Operators

$\oint$	$\oint$	$\backslash awint$	$\coprod$	$\coprod$	$\backslash coprod$	$\oint\!\oint$	$\oint\!\oint$	$\backslash oiiint$
$\sum$	$\sum$	$\backslash Bbbsum$	$\veevee$	$\veevee$	$\backslash disjquant$	$\oint\!\oint$	$\oint\!\oint$	$\backslash oiint$
$\cap$	$\cap$	$\backslash bigcap$	$\oint$	$\oint$	$\backslash fint$	$\oint$	$\oint$	$\backslash oint$
$\cup$	$\cup$	$\backslash bigcup$	$\oint\!\oint\!\oint$	$\oint\!\oint\!\oint$	$\backslash iiiint$	$\oint$	$\oint$	$\backslash ointccw$
$\uplus$	$\uplus$	$\backslash bigcupdot$	$\oint\!\oint\!\oint$	$\oint\!\oint\!\oint$	$\backslash iiint$	$\oint$	$\oint$	$\backslash pointint$
$\odot$	$\odot$	$\backslash bigodot$	$\oint\!\oint$	$\oint\!\oint$	$\backslash iint$	$\prod$	$\prod$	$\backslash prod$
$\oplus$	$\oplus$	$\backslash bigoplus$	$\int$	$\int$	$\backslash int$	$\oint$	$\oint$	$\backslash rppolint$
$\otimes$	$\otimes$	$\backslash bigotimes$	$\oint$	$\oint$	$\backslash intbar$	$\oint$	$\oint$	$\backslash scpolint$
$\sqcap$	$\sqcap$	$\backslash bigsqcap$	$\oint$	$\oint$	$\backslash intBar$	$\oint$	$\oint$	$\backslash sqint$
$\sqcup$	$\sqcup$	$\backslash bigsqcup$	$\oint$	$\oint$	$\backslash intcap$	$\sum$	$\sum$	$\backslash sum$
$\parallel$	$\parallel$	$\backslash bigtalloblong$	$\oint$	$\oint$	$\backslash intccw$	$\oint$	$\oint$	$\backslash sumint$
$\times$	$\times$	$\backslash bigtimes$	$\oint$	$\oint$	$\backslash intcup$	$\int$	$\int$	$\backslash upint$
$\uplus$	$\uplus$	$\backslash biguplus$	$\oint$	$\oint$	$\backslash intlarhk$	$\oint$	$\oint$	$\backslash varointccw$
$\veevee$	$\veevee$	$\backslash bigvee$	$\oint$	$\oint$	$\backslash intx$	$\backslash \backslash$	$\backslash \backslash$	$\backslash xsol$
$\wedgewedge$	$\wedgewedge$	$\backslash bigwedge$	$\int$	$\int$	$\backslash lowint$	$/$	$/$	$\backslash xsol$
$\oint$	$\oint$	$\backslash cirfnint$	$\Sigma$	$\Sigma$	$\backslash modtwosum$			

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$\wedge$	$\wedge\!\wedge$	<code>\conjquant</code>	$\oint$	$\oint\!\oint$	<code>\npolint</code>
----------	------------------	-------------------------	---------	----------------	-----------------------

By default, each of the integral-producing commands in Table 90 points to a slanted version of the glyph, as shown. The `upint` package option typesets each integral instead as an upright version. Slanted and upright integrals can be mixed, however, by explicitly using the commands shown in Table 91.

TABLE 91: `stix` Integrals with Explicit Slant

$\int$	$\int$	<code>\intsl</code>	$\int$	$\int$	<code>\intup</code>
$\iint$	$\iint$	<code>\iintsl</code>	$\iint$	$\iint$	<code>\iintup</code>
$\iiint$	$\iiint$	<code>\iiintsl</code>	$\iiint$	$\iiint$	<code>\iiintup</code>
$\oint$	$\oint$	<code>\ointsl</code>	$\oint$	$\oint$	<code>\ointup</code>
$\oiint$	$\oiint$	<code>\ointsl</code>	$\oiint$	$\oiint$	<code>\ointup</code>
$\oiint$	$\oiint$	<code>\oiintsl</code>	$\oiint$	$\oiint$	<code>\oiintup</code>
$\varointclockwise$	$\varointclockwise$	<code>\varointclockwise</code>	$\varointclockwise$	$\varointclockwise$	<code>\varointclockwiseup</code>
$\varointctr-clockwise$	$\varointctr-clockwise$	<code>\varointctr-clockwise</code>	$\varointctr-clockwise$	$\varointctr-clockwise$	<code>\varointctr-clockwiseup</code>
$\sumint$	$\sumint$	<code>\sumintsl</code>	$\sumint$	$\sumint$	<code>\sumintup</code>

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$\iiint$	$\iiiiii$	<code>\iiiiintsl</code>	$\iiiiii$	$\iiiiii$	<code>\iiiiintup</code>
$\int$	$\int$	<code>\intbarsl</code>	$\int$	$\int$	<code>\intbarup</code>
$\oint$	$\oint$	<code>\intBarsl</code>	$\oint$	$\oint$	<code>\intBarup</code>
$\oint$	$\oint$	<code>\fintsl</code>	$\oint$	$\oint$	<code>\fintup</code>
$\oint$	$\oint$	<code>\cirfnintsl</code>	$\oint$	$\oint$	<code>\cirfnintup</code>
$\oint$	$\oint$	<code>\awintsl</code>	$\oint$	$\oint$	<code>\awintup</code>
$\oint$	$\oint$	<code>\rppolintsl</code>	$\oint$	$\oint$	<code>\rppolintup</code>
$\oint$	$\oint$	<code>\scpolintsl</code>	$\oint$	$\oint$	<code>\scpolintup</code>
$\oint$	$\oint$	<code>\nopolintsl</code>	$\oint$	$\oint$	<code>\nopolintup</code>
$\oint$	$\oint$	<code>\pointintsl</code>	$\oint$	$\oint$	<code>\pointintup</code>
$\oint$	$\oint$	<code>\sqintsl</code>	$\oint$	$\oint$	<code>\sqintup</code>
$\oint$	$\oint$	<code>\intlarhksl</code>	$\oint$	$\oint$	<code>\intlarhkup</code>
$\oint$	$\oint$	<code>\intxsl</code>	$\oint$	$\oint$	<code>\intxup</code>
$\oint$	$\oint$	<code>\intcapsl</code>	$\oint$	$\oint$	<code>\intcapup</code>
$\oint$	$\oint$	<code>\intcups1</code>	$\oint$	$\oint$	<code>\intcupup</code>
$\overline{\int}$	$\overline{\int}$	<code>\upintsl</code>	$\overline{\int}$	$\overline{\int}$	<code>\upintup</code>

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$$\int \quad \int \quad \text{\textbackslash lowintsl} \qquad \int \quad \int \quad \text{\textbackslash lowintup}$$

Instead of using the preceding symbols directly, it is generally preferable to use the symbols listed in Table 90 either with or without the `upint` package option. Specifying `upint` selects each integral's upright (`up`) variant, while omitting `upint` selects each integral's slanted (`s1`) variant. Use the symbols shown in Table 91 only when you need to include both upright and slanted variations of a symbol in the same document.

TABLE 92: `cmupint` Variable-sized Upright Integrals

$\oint$	$\oint$	<code>\awint</code>	$\oint$	$\oint$	<code>\npolint</code>
$\oint$	$\oint$	<code>\barint</code>	$\oint\oint\oint$	$\oint\oint\oint$	<code>\oiint</code>
$\oint$	$\oint$	<code>\cirfnint</code>	$\oint\oint$	$\oint\oint$	<code>\oiint</code>
$\oint$	$\oint$	<code>\doublebarint</code>	$\oint$	$\oint$	<code>\oint</code>
$\int$	$\int$	<code>\downint</code>	$\oint$	$\oint$	<code>\ointclockwise</code>
$\oint$	$\oint$	<code>\fint</code>	$\oint$	$\oint$	<code>\ointctrcclockwise</code>
$\int \dots \int$	$\int \dots \int$	<code>\idotsint^*</code>	$\oint$	$\oint$	<code>\pointint</code>
$\int\int\int$	$\int\int\int$	<code>\iiint</code>	$\oint$	$\oint$	<code>\rppolint</code>
$\int\int\int$	$\int\int\int$	<code>\iiint</code>	$\oint$	$\oint$	<code>\scpolint</code>

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$\iint$	$\iint$	<code>\iint</code>	$\iint\!\iint$	$\iint\!\iint$	<code>\sqiint</code>
$\int$	$\int$	<code>\int</code>	$\oint$	$\oint$	<code>\sqint</code>
$\oint$	$\oint$	<code>\intcap</code>	$\oint$	$\oint$	<code>\sumint</code>
$\oint$	$\oint$	<code>\intclockwise</code>	$\int$	$\int$	<code>\upint</code>
$\oint$	$\oint$	<code>\intcup</code>	$\int\dots\int$	$\int\dots\int$	<code>\varidotsint^*</code>
$\oint$	$\oint$	<code>\intlarhk</code>	$\oint$	$\oint$	<code>\varointclockwise</code>
$\oint$	$\oint$	<code>\landdownint</code>	$\oint$	$\oint$	<code>\varointctrcclockwise</code>
$\oint$	$\oint$	<code>\landupint</code>	$\oint$	$\oint$	<code>\xint</code>

`cmupint` additionally provides `\longint`, `\longiint`, `\longoint`, and `\longoiint` commands that stretch arbitrarily tall. See the `cmupint` documentation for more information.

\* `\varidotsint` is always drawn as is. `\idotsint` is drawn identically to `\varidotsint` when `amsmath` is not loaded or with more space surrounding each dot when `amsmath` is loaded.

TABLE 93: `mathdesign` Variable-sized Math Operators

$\oint$	$\oint$	<code>\intclockwise</code>	$\oint$	$\oint$	<code>\ointclockwise</code>
$\oint\oint\oint$	$\oint\oint\oint$	<code>\oiint</code>	$\oint\oint\oint$	$\oint\oint\oint$	<code>\ointctrcclockwise</code>
$\oint\oint$	$\oint\oint$	<code>\oiint</code>			

The `mathdesign` package provides three versions of each integral—in fact, of every symbol—to accompany different text fonts: Utopia ( $\int$ ), Garamond ( $\oint$ ), and Charter ( $\oint$ ).

TABLE 94: pdfMsym Variable-sized Math Operators

$f$	$\int$	<code>\aint</code>	$\forall$	$\bigforall$	<code>\bigforall</code>
$\wedge$	$\wedge$	<code>\bigcircwedge</code>	$\int\!\!\!\int\!\!\!\int\!\!\!\int$	$\int\!\!\!\int\!\!\!\int\!\!\!\int\!\!\!\int$	<code>\biNint{5}*</code>
$\cup$	$\cup$	<code>\bigdcup</code>	$\int\!\!\!\int\!\!\!\int\!\!\!\int$	$\int\!\!\!\int\!\!\!\int\!\!\!\int\!\!\!\int$	<code>\iNint{5}*</code>
$\wedge$	$\wedge$	<code>\bigd wedge</code>	$\int\!\!\!\int\!\!\!\int\!\!\!\int$	$\int\!\!\!\int\!\!\!\int\!\!\!\int\!\!\!\int$	<code>\oiNint{5}*</code>
$\exists$	$\exists$	<code>\bigexists</code>			

`pdfMsym` symbols are implemented with PDF literals instead of (or sometimes in conjunction) with a font. All symbols can be rendered by `pdflATEX` and `LuaLATEX`, some by `XELATEX`, and none by most other `TEX` backends.

\* These commands have a required argument, which specifies the number of integrals. For example, `\oiNint{7}` produces the symbol



TABLE 95: prodint Variable-sized Math Operators

$\prod$	<code>\prodi</code>	$\prod$	<code>\Prodi</code>	$\prod$	<code>\PRODI</code>
---------	---------------------	---------	---------------------	---------	---------------------

`prodint` currently requires the author to manually specify `\prodi` for inline expressions ( $\$...$$ ), `\Prodi` for displayed math ( $\mathcal{[}...\mathcal{]}$ ), and `\PRODI` for displayed math involving tall integrands. The package does not define a product integral command that scales automatically akin to the symbols in Table 79.

TABLE 96: pdfMsym Extensible Math Operators

$$\prod \quad \backslash p r o o d \quad \sum \quad \backslash s u u m$$

These symbols extend horizontally to fit their lower and upper limits. Hence,

```
\suum_{i=\lfloor\sqrt{a^2 + b^2 + c^2}\rfloor}^{\max(5N-3, 11N-8)}
```

produces

$$\sum_{i=\lfloor\sqrt{a^2+b^2+c^2}\rfloor}^{\max(5N-3,11N-8)}.$$

pdfMsym symbols are implemented with PDF literals instead of (or sometimes in conjunction) with a font. All symbols can be rendered by pdfL<sup>A</sup>T<sub>E</sub>X and L<sup>a</sup>u<sub>L</sub><sup>A</sup>T<sub>E</sub>X, some by X<sub>H</sub>L<sup>A</sup>T<sub>E</sub>X, and none by most other T<sub>E</sub>X backends.

TABLE 97: cml Large Math Operators

$$\wp \quad \backslash b i g p a r r ^ * \quad \& \quad \backslash b i g w i t h$$

\* cml defines \biginvamp as a synonym for \bigparr.

TABLE 98: Binary Relations

$\approx$	<code>\approx</code>	$\equiv$	<code>\equiv</code>	$\perp$	<code>\perp</code>	$\smile$	<code>\smile</code>
$\asymp$	<code>\asymp</code>	$\sim$	<code>\frown</code>	$\prec$	<code>\prec</code>	$\succ$	<code>\succ</code>
$\bowtie$	<code>\bowtie</code>	$\bowtie$	<code>\Join^*</code>	$\preceq$	<code>\preceq</code>	$\succeq$	<code>\succeq</code>
$\cong$	<code>\cong</code>	$ $	<code>\mid^†</code>	$\propto$	<code>\propto</code>	$\vdash$	<code>\vdash</code>
$\dashv$	<code>\dashv</code>	$\models$	<code>\models</code>	$\sim$	<code>\sim</code>	$\vdash$	<code>\vdash</code>
$\doteq$	<code>\doteq</code>	$\parallel$	<code>\parallel</code>	$\simeq$	<code>\simeq</code>		

\* Not predefined by the L<sup>A</sup>T<sub>E</sub>X 2<sub>ε</sub> core. Use the latexsym package to expose this symbol.

† The difference between \mid and | is that the former is a binary relation while the latter is a math ordinal. Consequently, L<sup>A</sup>T<sub>E</sub>X typesets the two with different surrounding spacing. Contrast “P(A | B)”  $\mapsto$  “P(A|B)” with “P(A \mid B)”  $\mapsto$  “P(A | B)”.

TABLE 99:  $\mathcal{AM}$ S Binary Relations

$\approx$	<code>\approxeq</code>	$=$	<code>\eqcirc</code>	$\approx$	<code>\succapprox</code>
$\rightarrow$	<code>\backepsilon</code>	$\sqsubset$	<code>\fallingdotseq</code>	$\approx$	<code>\succcurlyeq</code>
$\hookleftarrow$	<code>\backsim</code>	$\multimap$		$\succsim$	
$\leftrightharpoons$	<code>\backsimeq</code>	$\pitchfork$		$\therefore$	<code>\therefore</code>
$\because$	<code>\because</code>	$\precapprox$		$\approx$	<code>\thickapprox</code>
$\between$	<code>\between</code>	$\preccurlyeq$		$\sim$	<code>\thicksim</code>
$\bowtie$	<code>\Bumpeq</code>	$\precsim$		$\propto$	<code>\varpropto</code>
$\doteq$	<code>\bumpeq</code>	$\risingdotseq$		$\Vdash$	<code>\Vdash</code>
$\circeq$	<code>\circeq</code>	$\shortmid$		$\vDash$	<code>\vDash</code>
$\curlyeqsucc$	<code>\curlyeqsucc</code>	$\shortparallel$		$\Vvdash$	<code>\Vvdash</code>
$\curlyeqapproxsucc$	<code>\curlyeqapproxsucc</code>	$\smallfrown$			
$\doteqdot$	<code>\doteqdot</code>	$\smallsmile$			

TABLE 100:  $\mathcal{AM}$ S Negated Binary Relations

$\not\equiv$	<code>\ncong</code>	$\not=$	<code>\nshortparallel</code>	$\not\approx$	<code>\nVDash</code>
$\not\vdash$	<code>\nmid</code>	$\not\sim$	<code>\nsim</code>	$\not\approx$	<code>\precnapprox</code>
$\not\parallel$	<code>\nparallel</code>	$\not\succ$	<code>\nsucc</code>	$\not\approx$	<code>\precnsim</code>
$\not\prec$	<code>\nprec</code>	$\not\succcurlyeq$	<code>\nsucccurlyeq</code>	$\not\approx$	<code>\succnapprox</code>
$\not\preceq$	<code>\npreceq</code>	$\not\vDash$	<code>\nvDash</code>	$\not\approx$	<code>\succnsm</code>
$\not\vdash$	<code>\nshortmid</code>	$\not\vdash$	<code>\nvdash</code>	$\not\approx$	

TABLE 101: stmaryrd Binary Relations

$\in \backslashinplus \ni \backslashniplus$

TABLE 102: wasysym Binary Relations

$\neg$	<code>\invneg</code>	$\leadsto$	<code>\leadsto</code>	$\propto$	<code>\wasypropto</code>
$\bowtie$	<code>\Join</code>	$\otimes$	<code>\logof</code>		

TABLE 103: txfonts/pfxfonts Binary Relations

$\ominus$	<code>\circledgtr</code>	$\ltimes$	<code>\lJoin</code>	$\times$	<code>\opentimes</code>
$\oslash$	<code>\circledless</code>	$\bowtie$	<code>\lRtimes</code>	$\perp\!\!\!\perp$	<code>\Perp</code>
$\approx$	<code>\colonapprox</code>	$\multimap$	<code>\multimap</code>	$\asymp$	<code>\preceqq</code>
$\doteqdot$	<code>\Colonapprox</code>	$\multimapboth$	<code>\multimapboth</code>	$\asymp\!\!\!\asymp$	<code>\precneqq</code>
$\doteqdot$	<code>\coloneq</code>	$\circ$	<code>\multimapbothvert</code>	$\bowtie$	<code>\rJoin</code>
$\doteqdot$	<code>\Coloneq</code>	$\bullet$	<code>\multimapdot</code>	$\varepsilon$	<code>\strictfi</code>
$\doteqdot$	<code>\Coloneqq</code>	$\bullet\bullet$	<code>\multimapdotboth</code>	$\varepsilon\!\!\varepsilon$	<code>\strictif</code>
$\doteqdot$	<code>\Coloneqq^*</code>	$\circ\bullet$	<code>\multimapdotbothA</code>	$\varepsilon\!\!\varepsilon\!\!\varepsilon$	<code>\strictiff</code>
$\doteqdot$	<code>\Colonsim</code>	$\circ$	<code>\multimapdotbothAvert</code>	$\geq$	<code>\succeqq</code>
$\doteqdot$	<code>\colonsim</code>	$\bullet$	<code>\multimapdotbothB</code>	$\asymp$	<code>\succneqq</code>
$\doteqdot$	<code>\Eqcolon</code>	$\bullet\circ$	<code>\multimapdotbothBvert</code>	$\parallel$	<code>\varparallel</code>
$\doteqdot$	<code>\eqcolon</code>	$\bullet\bullet$	<code>\multimapdotbothvert</code>	$\parallel\!\!\!\parallel$	<code>\varparallelinv</code>
$\doteqdot$	<code>\eqqcolon</code>	$\bullet$	<code>\multimapdotinv</code>	$\Vdash$	<code>\VvDash</code>
$\doteqdot$	<code>\Eqqcolon</code>	$\circ$	<code>\multimapinv</code>		
$\doteqdot$	<code>\eqsim</code>	$\times$	<code>\openJoin</code>		

\* As an alternative to using txfonts/pfxfonts, a “:=” symbol can be constructed with “`\mathrel{\mathop{:}}=`”.

TABLE 104: txfonts/pfxfonts Negated Binary Relations

$\not\equiv$	<code>\napproxeq</code>	$\not\approx$	<code>\npreccurlyeq</code>	$\not\approx$	<code>\nthickapprox</code>
$\not\equiv$	<code>\nasmp</code>	$\not\approx$	<code>\npreceqq</code>	$\not\leftrightarrow$	<code>\ntwoheadleftarrow</code>
$\not\sim$	<code>\backsim</code>	$\not\sim$	<code>\nprecsim</code>	$\not\Rightarrow$	<code>\ntwoheadrightarrow</code>
$\not\approx$	<code>\backsimeq</code>	$\not\approx$	<code>\nsimeq</code>	$\not\#$	<code>\nvarparallel</code>
$\not\approx$	<code>\bumpeq</code>	$\not\approx$	<code>\nsuccapprox</code>	$\not\#$	<code>\nvarparallelinv</code>
$\not\approx$	<code>\Bumpeq</code>	$\not\approx$	<code>\nsucccurlyeq</code>	$\not\Vdash$	
$\not\equiv$	<code>\nequiv</code>	$\not\approx$	<code>\nsucceqq</code>		
$\not\approx$	<code>\precapprox</code>	$\not\approx$	<code>\succsim</code>		

TABLE 105: mathabx Binary Relations

$\between$	<code>\between</code>	$ $	<code>\divides</code>	$\therefore$	<code>\risingdotseq</code>
$\botdot$	<code>\botdot</code>	$\div$	<code>\dotseq</code>	$\approx$	<code>\succapprox</code>
$\Bumpedeq$	<code>\Bumpedeq</code>	$\sqsubset$	<code>\eqbumped</code>	$\asymp$	<code>\succcurlyeq</code>
$\bumpedeq$	<code>\bumpedeq</code>	$\equiv$	<code>\eqcirc</code>	$\triangleright$	<code>\succdot</code>
$\circeq$	<code>\circeq</code>	$\eqqcolon$	<code>\fallingdotseq</code>	$\asymp$	<code>\succsim</code>
$\coloneq$	<code>\coloneq</code>	$\eqqcolon$	<code>\fallingdotseq</code>	$\therefore$	<code>\therefore</code>
$\corresponds$	<code>\corresponds</code>	$\ggcurly$		$\div$	<code>\topdot</code>
$\curlyeqprec$	<code>\curlyeqprec</code>	$\llcurly$		$\Vdash$	<code>\vDash</code>
$\curlyeqsucc$	<code>\curlyeqsucc</code>	$\asymp$	<code>\preccurlyeq</code>	$\Vdash$	<code>\Vdash</code>
$\DashV$	<code>\DashV</code>	$\asymp$	<code>\preccurlyeq</code>	$\Vdash$	<code>\Vdash</code>
$\Dashv$	<code>\Dashv</code>	$\triangleleft$	<code>\precdot</code>	$\Vdash$	<code>\Vdash</code>
$\dashVv$	<code>\dashVv</code>	$\asymp$	<code>\precsim</code>	$\Vdash$	<code>\Vdash</code>

TABLE 106: mathabx Negated Binary Relations

$\not\approx$	<code>\napprox</code>	$\not\trianglelefteq$	<code>\notperp</code>	$\not\models$	<code>\nvDash</code>
$\not\cong$	<code>\ncong</code>	$\not\prec$	<code>\nprec</code>	$\not\models$	<code>\nVdash</code>
$\not\eqqprec$	<code>\ncurlyeqprec</code>	$\not\approx$	<code>\nprecapprox</code>	$\not\models$	<code>\nVdash</code>
$\not\eqqsucc$	<code>\ncurlyeqsucc</code>	$\not\approx$	<code>\npreccurlyeq</code>	$\not\models$	<code>\nvdash</code>
$\not\dashv$	<code>\nDashv</code>	$\not\preceq$	<code>\npreceq</code>	$\not\models$	<code>\nVash</code>
$\not\dashv$	<code>\ndashv</code>	$\not\precsim$	<code>\nprecsim</code>	$\not\models$	<code>\precnapprox</code>
$\not\dashv$	<code>\ndashv</code>	$\not\simeq$	<code>\nsim</code>	$\not\models$	<code>\precneq</code>
$\not\dashv$	<code>\Dashv</code>	$\not\simeq$	<code>\nsimeq</code>	$\not\models$	<code>\precnsim</code>
$\not\dashv$	<code>\ndashVv</code>	$\not\succ$	<code>\nsucc</code>	$\not\models$	<code>\succnapprox</code>
$\not=$	<code>\neq</code>	$\not\approx$	<code>\nsuccapprox</code>	$\not\models$	<code>\succneq</code>
$\not\asymp$	<code>\notasymp</code>	$\not\approx$	<code>\nsucccurlyeq</code>	$\not\models$	<code>\succnnsim</code>
$\not\mid$	<code>\notdivides</code>	$\not\preceq$	<code>\nsucceq</code>	$\not\models$	
$\not\equiv$	<code>\notequiv</code>	$\not\approx$	<code>\nsuccsim</code>	$\not\models$	

The `\changenotsign` command toggles the behavior of `\not` to produce either a vertical or a diagonal slash through a binary operator. Thus, “\$a \not= b\$” can be made to produce either “ $a \not\models b$ ” or “ $a \not\models b$ ”.

TABLE 107: MnSymbol Binary Relations

$\approx$	<code>\approx</code>	$\trianglelefteq$	<code>\hateq</code>	$\circlearrowright$	<code>\rightpropto</code>
$\approx$	<code>\approxeq</code>	$\times$	<code>\hcrossing</code>	$\triangleright$	<code>\rightslice</code>
$\lessapprox$	<code>\backapprox</code>	$\vdash$	<code>\leftfootline</code>	$\Vdash$	<code>\rightVdash</code>
$\lessapprox$	<code>\backapproxeq</code>	$\leftarrow$	<code>\leftfree</code>	$\vdash$	<code>\rightvdash</code>
$\lessapprox$	<code>\backcong</code>	$\sqsupseteq$	<code>\leftmodels</code>	$\dot{\vdash}$	<code>\risingdotseq</code>
$\lessapprox$	<code>\backeqsim</code>	$\sqsupseteq$	<code>\leftModels</code>	$\swarrow$	<code>\sefootline</code>
$\lessdot$	<code>\backsim</code>	$\infty$	<code>\leftpropto</code>	$\swarrow$	<code>\sefree</code>
$\lessdot$	<code>\backsimeq</code>	$-$	<code>\leftrightline</code>	$\nwarrow$	<code>\seModels</code>
$\lessdot$	<code>\backtriplesim</code>	$=$	<code>\Leftrightline</code>	$\nwarrow$	<code>\semmodels</code>
$\between$	<code>\between</code>	$\diamond$	<code>\leftslice</code>	$\circ$	<code>\separated</code>
$\doteq$	<code>\bumpeq</code>	$\dashv$	<code>\leftVdash</code>	$\circ$	<code>\seVdash</code>
$\doteq$	<code>\Bumpeq</code>	$\dashv$	<code>\leftvdash</code>	$\wedge$	<code>\sevdash</code>
$\circledcirc$	<code>\circeq</code>	$\nearrow$	<code>\nefootline</code>	$\parallel$	<code>\shortparallel</code>
$\sqsupseteq$	<code>\closeddequal</code>	$\nearrow$	<code>\nefree</code>	$\sim$	<code>\sim</code>
$\triangleleft$	<code>\closedprec</code>	$\lessapprox$	<code>\neModels</code>	$\simeq$	<code>\simeq</code>
$\triangleright$	<code>\closedsucc</code>	$\lessapprox$	<code>\nemodels</code>	$\succ$	<code>\succ</code>
$\coloneqq$	<code>\coloneq</code>	$/$	<code>\neswline</code>	$\approx$	<code>\succapprox</code>
$\cong$	<code>\cong</code>	$\equiv$	<code>\Neswline</code>	$\approx$	<code>\succcurlyeq</code>
$\lessdot$	<code>\curlyeqprec</code>	$\lessapprox$	<code>\neVdash</code>	$\succeq$	<code>\succeq</code>
$\lessdot$	<code>\curlyeqsucc</code>	$\lessdot$	<code>\nevDash</code>	$\approx$	<code>\succcsim</code>

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$\div$	<code>\Doteq</code>	$\wedge$	<code>\nwfootline</code>	$\checkmark$	<code>\swfootline</code>
$\doteq$	<code>\doteq</code>	$\nwarrow$	<code>\nwfreete</code>	$\checkmark$	<code>\swfreete</code>
$\downarrow$	<code>\downfootline</code>	$\nwmodels$		$\nwarrow$	<code>\swModels</code>
$\downarrow$	<code>\downfree</code>	$\nwModels$		$\nwarrow$	<code>\swmodels</code>
$\Downarrow$	<code>\downmodels</code>	$\nwsecrossing$		$\nwarrow$	<code>\swVdash</code>
$\Downarrow$	<code>\downModel</code>	$\Nwse$		$\nwarrow$	<code>\swvDash</code>
$\Downarrow$	<code>\downpropto</code>	$\Nwse$		$\approx$	<code>\triplesim</code>
$\Downarrow$	<code>\downvDash</code>	$\nwvDash$		$ $	<code>\updownline</code>
$\Downarrow$	<code>\downVdash</code>	$\nwvDash$		$\parallel$	<code>\Updownline</code>
$\eqless$	<code>\eqbump</code>	$\prec$		$\top$	<code>\upfootline</code>
$\eqapprox$	<code>\eqcirc</code>	$\preccurlyeq$		$\top$	<code>\upfree</code>
$\eqless$	<code>\eqdot</code>	$\preccurlyeq$		$\perp$	<code>\upModels</code>
$\eqsim$	<code>\eqsim</code>	$\preceq$		$\perp$	<code>\upmodels</code>
$\eqsim$	<code>\equal</code>	$\precsim$		$\approx$	<code>\uppropto</code>
$\eqclosed$	<code>\equalclosed</code>	$\rightarrow$	<code>\rightfootline</code>	$\perp$	<code>\upvDash</code>
$\equiv$	<code>\equiv</code>	$\rightarrow$	<code>\rightfree</code>	$\perp$	<code>\upVdash</code>
$\equiv$	<code>\equivclosed</code>	$\models$	<code>\rightmodels</code>	$\times$	<code>\vcrossing</code>
$\eqless$	<code>\fallingdotseq</code>	$\Vdash$	<code>\rightModel</code>	$\Vdash$	<code>\VvDash</code>

MnSymbol additionally defines synonyms for some of the preceding symbols:

$\dashv$	<code>\dashv</code>	(same as <code>\leftvDash</code> )
$\diagdown$	<code>\diagdown</code>	(same as <code>\Nwse</code> )
$\diagup$	<code>\diagup</code>	(same as <code>\Nesw</code> )
$\divides$	<code>\divides</code>	(same as <code>\updownline</code> )
$\doteqdot$	<code>\doteqdot</code>	(same as <code>\Doteq</code> )
$\models$	<code>\models</code>	(same as <code>\rightmodels</code> )
$\parallel$	<code>\parallel</code>	(same as <code>\Updownline</code> )
$\perp$	<code>\perp</code>	(same as <code>\upvDash</code> )
$\propto$	<code>\propto</code>	(same as <code>\leftpropto</code> )
$\relbar$	<code>\relbar</code>	(same as <code>\leftrightline</code> )
$\Relbar$	<code>\Relbar</code>	(same as <code>\Leftrightline</code> )
$\varpropto$	<code>\varpropto</code>	(same as <code>\leftpropto</code> )
$\vDash$	<code>\vDash</code>	(same as <code>\rightmodels</code> )
$\Vdash$	<code>\Vdash</code>	(same as <code>\rightModel</code> )
$\vdash$	<code>\vdash</code>	(same as <code>\rightvDash</code> )
$\Vdash$	<code>\Vdash</code>	(same as <code>\rightVdash</code> )

TABLE 108: MnSymbol Negated Binary Relations

$\approx$	<code>\napprox</code>	$\not\vdash$	<code>\nleftfootline</code>	$\not\models$	<code>\nrisingdotseq</code>
$\not\approx$	<code>\napproxeq</code>	$\not\Leftarrow$	<code>\nleftfree</code>	$\not\asymp$	<code>\nsefootline</code>
$\not\approx$	<code>\nbackapprox</code>	$\not\models$	<code>\nleftmodels</code>	$\not\asymp$	<code>\nsefree</code>
$\not\approx$	<code>\nbackapproxeq</code>	$\not\models\mid$	<code>\nleftModels</code>	$\not\asymp\!\!\!$	<code>\nseModels</code>
$\not\approx$	<code>\nbackcong</code>	$\not\vdash$	<code>\nleftrightline</code>	$\not\asymp$	<code>\nsemmodels</code>
$\not\approx$	<code>\nbackeqsim</code>	$\not\models$	<code>\nLeftrightline</code>	$\not\asymp$	<code>\nsevdash</code>
$\not\approx$	<code>\nbacksimeq</code>	$\not\models\mid$	<code>\nleftvdash</code>	$\not\asymp\!\!\!$	<code>\nseVdash</code>
$\not\approx$	<code>\nbacktriplesim</code>	$\not\times$	<code>\nnefootline</code>	$\not\times$	<code>\nshortparallel</code>
$\not\approx$	<code>\nbumpeq</code>	$\not\times$	<code>\nnefree</code>	$\not\sim$	<code>\nsim</code>
$\not\approx$	<code>\nBumpeq</code>	$\not\asymp\!\!\!$	<code>\nnemodels</code>	$\not\approx$	<code>\nsimeq</code>
$\not\approx$	<code>\ncirceq</code>	$\not\asymp\!\!\!$	<code>\nneModels</code>	$\not\succ$	<code>\nsucc</code>
$\not\approx$	<code>\nclosedequal</code>	$\not\times$	<code>\nneswline</code>	$\not\approx\!\!\!$	<code>\nsuccapprox</code>
$\not\approx$	<code>\ncong</code>	$\not\asymp\!\!\!$	<code>\nNeswline</code>	$\not\approx\!\!\!$	<code>\nsucccurlyeq</code>
$\not\approx$	<code>\ncurlyeqprec</code>	$\not\asymp\!\!\!$	<code>\nneVdash</code>	$\not\approx\!\!\!$	<code>\nsucceq</code>
$\not\approx$	<code>\ncurlyeqsucc</code>	$\not\times$	<code>\nnevdash</code>	$\not\approx\!\!\!$	<code>\nsuccsim</code>
$\not\approx$	<code>\ndoteq</code>	$\not\times$	<code>\nnwfootline</code>	$\not\times$	<code>\nswfootline</code>
$\not\approx$	<code>\nDoteq</code>	$\not\times$	<code>\nnwfree</code>	$\not\asymp\!\!\!$	<code>\nswfree</code>
$\not\approx$	<code>\ndownfootline</code>	$\not\asymp\!\!\!$	<code>\nnwmodels</code>	$\not\asymp\!\!\!$	<code>\nswModels</code>
$\not\approx$	<code>\ndownfree</code>	$\not\asymp\!\!\!$	<code>\nnwModels</code>	$\not\asymp\!\!\!$	<code>\nswmodels</code>
$\not\approx$	<code>\ndownModels</code>	$\not\asymp\!\!\!$	<code>\nNwseline</code>	$\not\times$	<code>\nswvdash</code>
$\not\approx$	<code>\ndownmodels</code>	$\not\times$	<code>\nmwseline</code>	$\not\asymp\!\!\!$	<code>\nswVdash</code>
$\not\approx$	<code>\ndownVdash</code>	$\not\asymp\!\!\!$	<code>\nnwvDash</code>	$\not\asymp\!\!\!$	<code>\ntriplesim</code>
$\not\approx$	<code>\ndownvDash</code>	$\not\asymp\!\!\!$	<code>\nnwVdash</code>	$\not\approx\!\!\!$	<code>\nUpdownline</code>
$\not\approx$	<code>\neqbump</code>	$\not\vdash$	<code>\nprec</code>	$\not\vdash$	<code>\nupdownline</code>
$\not\approx$	<code>\neqcirc</code>	$\not\asymp\!\!\!$	<code>\nprecapprox</code>	$\not\vdash$	<code>\nupfootline</code>
$\not\approx$	<code>\neqdot</code>	$\not\asymp\!\!\!$	<code>\npreccurlyeq</code>	$\not\vdash$	<code>\nupfree</code>
$\not\approx$	<code>\neqsim</code>	$\not\asymp\!\!\!$	<code>\npreceq</code>	$\not\approx\!\!\!$	<code>\nupModels</code>
$\not\approx$	<code>\nequal</code>	$\not\asymp\!\!\!$	<code>\nprecsim</code>	$\not\approx\!\!\!$	<code>\nupmodels</code>
$\not\approx$	<code>\nequalclosed</code>	$\not\vdash$	<code>\nrightfootline</code>	$\not\approx\!\!\!$	<code>\nupVdash</code>
$\not\approx$	<code>\nequiv</code>	$\not\vdash$	<code>\nrightfree</code>	$\not\approx\!\!\!$	<code>\nupvDash</code>
$\not\approx$	<code>\nequivclosed</code>	$\not\models\mid$	<code>\nrightModels</code>	$\not\asymp\!\!\!$	<code>\precnapprox</code>
$\not\approx$	<code>\neswcrossing</code>	$\not\models$	<code>\nrightmodels</code>	$\not\asymp\!\!\!$	<code>\precnsim</code>
$\not\approx$	<code>\nfallingdotseq</code>	$\not\models$	<code>\nrightvdash</code>	$\not\asymp\!\!\!$	<code>\succcnapprox</code>
$\not\approx$	<code>\nhateq</code>	$\not\models\mid$	<code>\nrightVdash</code>	$\not\asymp\!\!\!$	<code>\succcnsim</code>

MnSymbol additionally defines synonyms for some of the preceding symbols:

#	\ndashv	(same as \nleftvdash)
x	\ndiagdown	(same as \nnwsepline)
x	\ndiagup	(same as \nneswline)
†	\ndivides	(same as \nupdownline)
#	\ne	(same as \nequal)
#	\neq	(same as \nequal)
†	\nmid	(same as \nupdownline)
#	\nmodels	(same as \nrightmodels)
#	\nparallel	(same as \nUpdownline)
±	\nperp	(same as \nupvdash)
+	\nrelbar	(same as \nleftrightline)
#	\nRelbar	(same as \nLeftrightline)
#	\nvDash	(same as \nrightmodels)
#	\nvdash	(same as \nrightvdash)
#	\nVdash	(same as \nrightVdash)
#	\nVDash	(same as \nrightModels)

TABLE 109: fdsymbol Binary Relations

≈	\approx	≡	\equiv	\models	\rightmodels
≈	\approxeq	≐	\fallingdotseq	\vdash	\rightVdash
≤	\backcong	⌞	\frown	\vdash	\rightVdash
≥	\backproto	≣	\frownreq	\vdash	\rightvdash
~	\backsimeq	⌠	\frownsmile	\vdash	\rightvdash
≤	\backsimeq	∈	\in	\vdash	\risingdotseq
⌞	\between	⊣	\leftassert		\shortmid
⌞	\bowtie	⊣	\leftAssert		\shortparallel
≤	\bumpeq	⊓	\leftfootline	~	\sim
≈	\Bumpeq	⊣	\leftmodels	≈	\simeq
≈	\bumpeqq	⊣	\leftvdash	~	\smile
≈	\circeq	⊣	\leftvDash	≈	\smileeq
≈	\coloneq	⊣	\leftVdash	≈	\smilefrown
≈	\cong	⊣	\leftVDash	≈	\stareq
×	\crossing	⊑	\longleftfootline	>	\succ
≺	\curlyeqprec	⊑	\Longmapsfrom	≈	\succapprox
≻	\curlyeqsucc	⊑	\longmapsfrom	≈	\succcurlyeq
⊓	\dashVv	⊑	\longrightfootline	≥	\succeq
⊓	\Dashv		\mid	≥	\succeqq
⌞	\dotcong	Ǝ	\owns	≥	\succsim
⌞	\doteq		\parallel	≈	\thickapprox
⌞	\Doteq	⌞	\prec	~	\thicksim
⌞	\dotsminusdots	≈	\precapprox	≈	\triplesim
⊓	\downAssert	≈	\preccurlyeq	⊥	\upassert

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$\top$	<code>\downassert</code>	$\ltimes$	<code>\preceq</code>	$\perp$	<code>\upAssert</code>
$\pi$	<code>\downmodels</code>	$\asymp$	<code>\preceqq</code>	$\nparallel$	<code>\upmodels</code>
$\Pi$	<code>\downvDash</code>	$\approx$	<code>\precnapprox</code>	$\perp\!\!\perp$	<code>\upvDash</code>
$\bar{\top}$	<code>\downVdash</code>	$\not\sim$	<code>\precneq</code>	$\nparallel\!\!\nparallel$	<code>\upvDash</code>
$\bar{\top}$	<code>\downvdash</code>	$\not\approx$	<code>\precneqq</code>	$\perp\!\!\perp\!\!\perp$	<code>\upVdash</code>
$\bar{\Pi}$	<code>\downVDash</code>	$\not\approx$	<code>\precnsim</code>	$\nparallel\!\!\nparallel\!\!\nparallel$	<code>\upVDash</code>
$\equiv$	<code>\eqcirc</code>	$\approx$	<code>\precsim</code>	$\equiv$	<code>\vDash</code>
$=:$	<code>\eqcolon</code>	$\propto$	<code>\proto</code>	$\asymp$	<code>\veeeq</code>
$=.$	<code>\eqdot</code>	$\vdash$	<code>\rightassert</code>	$\Vdash$	<code>\Vdash</code>
$\approx$	<code>\eqsim</code>	$\Vdash$	<code>\rightAssert</code>	$\trianglelefteq$	<code>\wedgeq</code>
$=$	<code>\equal</code>	$\rightarrow$	<code>\rightfootline</code>		

`fdsymbol` defines synonyms for many of the preceding symbols:

$\approx$	<code>\approxident</code>	$\dashv$	<code>\dashV</code>	$\vdash$	<code>\shortrighttack</code>
$\equiv$	<code>\arceq</code>	$\doteqdot$	<code>\doteqdot</code>	$\perp$	<code>\shortuptack</code>
$\Vdash$	<code>\Assert</code>	$=:$	<code>\eqcolon</code>	$\smallfrown$	<code>\smallfrown</code>
$\vdash$	<code>\assert</code>	$\hat{=}$	<code>\hateq</code>	$\smallsmile$	<code>\smallsmile</code>
$\asymp$	<code>\asymp</code>	$\bowtie$	<code>\Join</code>	$\varpropto$	<code>\varpropto</code>
$\bar{\top}$	<code>\Barv</code>	$\overline{\phantom{x}}$	<code>\longdashv</code>	$\perp$	<code>\vBar</code>
$\bar{\Pi}$	<code>\barV</code>	$\models$	<code>\models</code>	$\Vdash$	<code>\Vdash</code>
$\circ$	<code>\closure</code>	$\ni$	<code>\ni</code>	$\vDash$	<code>\vDash</code>
$\coloneqq$	<code>\coloneqq</code>	$\perp$	<code>\perp</code>	$\Vdash$	<code>\Vdash</code>
$\dashv$	<code>\dashv</code>	$\propto$	<code>\propfrom</code>	$\Vdash$	<code>\Vdash</code>
$\DashV$	<code>\DashV</code>	$\top$	<code>\shortdowntack</code>	$\vdash$	<code>\vdash</code>
$\Dashv$	<code>\Dashv</code>	$\dashv$	<code>\shortlefttack</code>	$\overline{\phantom{x}}$	<code>\vlongdash</code>

TABLE 110: `fdsymbol` Negated Binary Relations

$\not\approx$	<code>\backsimneqq</code>	$\notin$	<code>\nin</code>	$\not+$	<code>\nsim</code>
$\not\approx$	<code>\napprox</code>	$\not\models$	<code>\nleftAssert</code>	$\not\equiv$	<code>\nsimeq</code>
$\not\approx$	<code>\napproxeq</code>	$\not\vdash$	<code>\nleftassert</code>	$\not\sim$	<code>\nsmile</code>
$\not\approx$	<code>\nbackcong</code>	$\not\vdash$	<code>\nleftfootline</code>	$\not\approx$	<code>\nsmileeq</code>
$\not\approx$	<code>\nbacksim</code>	$\not\vdash$	<code>\nleftmodels</code>	$\not\approx$	<code>\nsmilefrown</code>
$\not\approx$	<code>\nbacksimeq</code>	$\not\vdash$	<code>\nlefttvDash</code>	$\not\approx$	<code>\nstareq</code>
$\not\approx$	<code>\nbumppeq</code>	$\not\vdash$	<code>\nleftvdash</code>	$\not\approx$	<code>\nsucc</code>
$\not\approx$	<code>\nBumppeq</code>	$\not\models$	<code>\nleftVdash</code>	$\not\approx$	<code>\nsuccapprox</code>
$\not\approx$	<code>\nbumppeqq</code>	$\not\models$	<code>\nleftVDash</code>	$\not\approx$	<code>\nsucccurlyeq</code>
$\not\approx$	<code>\ncirceq</code>	$\not\vdash$	<code>\nlongleftfootline</code>	$\not\approx$	<code>\nsucceq</code>

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$\not\equiv$	<code>\ncong</code>	$\not\equiv$	<code>\nLongmapsfrom</code>	$\not\equiv$	<code>\nsucceqq</code>
$\not\equiv$	<code>\ncurlyeqprec</code>	$\not\equiv$	<code>\nlongmapsfrom</code>	$\not\equiv$	<code>\nsuccsim</code>
$\not\equiv$	<code>\ncurlyeqsucc</code>	$\not\equiv$	<code>\nlongrightfootline</code>	$\not\equiv$	<code>\ntriplesim</code>
$\not\equiv$	<code>\ndashVv</code>	$\not\equiv$	<code>\nmid</code>	$\not\equiv$	<code>\upassert</code>
$\not\equiv$	<code>\nDashv</code>	$\not\equiv$	<code>\nowns</code>	$\not\equiv$	<code>\upAssert</code>
$\not\equiv$	<code>\ndoteq</code>	$\not\equiv$	<code>\nparallel</code>	$\not\equiv$	<code>\upmodels</code>
$\not\equiv$	<code>\nDoteq</code>	$\not\equiv$	<code>\nprec</code>	$\not\equiv$	<code>\upVDash</code>
$\not\equiv$	<code>\ndownassert</code>	$\not\equiv$	<code>\nprecapprox</code>	$\not\equiv$	<code>\upvDash</code>
$\not\equiv$	<code>\downAssert</code>	$\not\equiv$	<code>\npreccurlyeq</code>	$\not\equiv$	<code>\upVdash</code>
$\not\equiv$	<code>\downmodels</code>	$\not\equiv$	<code>\npreceq</code>	$\not\equiv$	<code>\upvdash</code>
$\not\equiv$	<code>\downnvDash</code>	$\not\equiv$	<code>\npreceqq</code>	$\not\equiv$	<code>\nvDdash</code>
$\not\equiv$	<code>\downVdash</code>	$\not\equiv$	<code>\nprecsim</code>	$\not\equiv$	<code>\nveeeq</code>
$\not\equiv$	<code>\downVDash</code>	$\not\equiv$	<code>\nrightassert</code>	$\not\equiv$	<code>\nVdash</code>
$\not\equiv$	<code>\downnvDash</code>	$\not\equiv$	<code>\nrightAssert</code>	$\not\equiv$	<code>\nwedgeq</code>
$\not\equiv$	<code>\neqcirc</code>	$\not\equiv$	<code>\nrightfootline</code>	$\not\equiv$	<code>\precneq</code>
$\not\equiv$	<code>\neqdot</code>	$\not\equiv$	<code>\nrightmodels</code>	$\not\equiv$	<code>\precneqq</code>
$\not\equiv$	<code>\eqsim</code>	$\not\equiv$	<code>\nrightvDash</code>	$\not\equiv$	<code>\simneqq</code>
$\not\equiv$	<code>\nequal</code>	$\not\equiv$	<code>\nrightVdash</code>	$\not\equiv$	<code>\succnapprox</code>
$\not\equiv$	<code>\nequiv</code>	$\not\equiv$	<code>\nrightvDash</code>	$\not\equiv$	<code>\succneq</code>
$\not\equiv$	<code>\nfallingdotseq</code>	$\not\equiv$	<code>\nrightVDash</code>	$\not\equiv$	<code>\succneqq</code>
$\not\equiv$	<code>\nfrown</code>	$\not\equiv$	<code>\nrisingdotseq</code>	$\not\equiv$	<code>\succnsim</code>
$\not\equiv$	<code>\frownneq</code>	$\not\equiv$	<code>\nshortmid</code>		
$\not\equiv$	<code>\frownsmile</code>	$\not\equiv$	<code>\nshortparallel</code>		

`fdsymbol` defines synonyms for many of the preceding symbols:

$\not\equiv$	<code>\napproxident</code>	$\not\equiv$	<code>\ndashV</code>	$\not\equiv$	<code>\nshortrighttack</code>
$\not\equiv$	<code>\narceq</code>	$\not\equiv$	<code>\ne</code>	$\not\equiv$	<code>\nshortuptack</code>
$\not\equiv$	<code>\nAssert</code>	$\not\equiv$	<code>\neq</code>	$\not\equiv$	<code>\nsime</code>
$\not\equiv$	<code>\nassert</code>	$\not\equiv$	<code>\nhateq</code>	$\not\equiv$	<code>\nvBar</code>
$\not\equiv$	<code>\nasmp</code>	$\not\equiv$	<code>\nlongdashv</code>	$\not\equiv$	<code>\nVbar</code>
$\not\equiv$	<code>\nBarv</code>	$\not\equiv$	<code>\nmodels</code>	$\not\equiv$	<code>\nVdash</code>
$\not\equiv$	<code>\nbarV</code>	$\not\equiv$	<code>\nni</code>	$\not\equiv$	<code>\nvDash</code>
$\not\equiv$	<code>\nclosure</code>	$\not\equiv$	<code>\notinin</code>	$\not\equiv$	<code>\nVDash</code>
$\not\equiv$	<code>\nDashV</code>	$\not\equiv$	<code>\nperp</code>	$\not\equiv$	<code>\nvDash</code>
$\not\equiv$	<code>\nDashv</code>	$\not\equiv$	<code>\nshortdowntack</code>	$\not\equiv$	<code>\nvlongdash</code>
$\not\equiv$	<code>\ndashv</code>	$\not\equiv$	<code>\nshortlefttack</code>		

TABLE 111: boisik Binary Relations

$\approx$	<code>\ac</code>	$\mathbin{\!/\mkern-5mu/\!}$	<code>\fatslash</code>	$\succ$	<code>\scurel</code>
$\approxeq$	<code>\approxeq</code>	$\cap$	<code>\forkv</code>	$\vdash$	<code>\shortmid</code>
$\arceq$	<code>\arceq</code>	$\smile$	<code>\frown</code>	$\parallel$	<code>\shortparallel</code>
$\backsim$	<code>\backsim</code>	$\succcurlyeq$	<code>\ggcurly</code>	$\approx$	<code>\simrdots</code>
$\backsimeq$	<code>\backsimeq</code>	$\#$	<code>\hash</code>	$\smallfrown$	<code>\smallfrown</code>
$\bagmember$	<code>\bagmember</code>	$\in$	<code>\inplus</code>	$\smallsmile$	<code>\smallsmile</code>
$\because$	<code>\because</code>	$\approx$	<code>\kernelcontraction</code>	$\smile$	<code>\smile</code>
$\between$	<code>\between</code>	$\llcurly$	<code>\llcurly</code>	$\triangleright$	<code>\strictfi</code>
$\bumpeq$	<code>\bumpeq</code>	$\multimap$	<code>\multimap</code>	$\rightarrow$	<code>\strictif</code>
$\Bumpeq$	<code>\Bumpeq</code>	$\multimapboth$	<code>\multimapboth</code>	$\succapprox$	<code>\succapprox</code>
$\circeq$	<code>\circeq</code>	$\multimapbothvert$	<code>\multimapbothvert</code>	$\succcurlyeq$	<code>\succcurlyeq</code>
$\CircledEq$	<code>\CircledEq</code>	$\multimapdot$	<code>\multimapdot</code>	$\succnapprox$	<code>\succnapprox</code>
$\cong$	<code>\cong</code>	$\multimapdotboth$	<code>\multimapdotboth</code>	$\succneqq$	<code>\succneqq</code>
$\corresponds$	<code>\corresponds</code>	$\multimapdotbothA$	<code>\multimapdotbothA</code>	$\succnsim$	<code>\succnsim</code>
$\curlyeqprec$	<code>\curlyeqprec</code>	$\multimapdotbothAvert$	<code>\multimapdotbothAvert</code>	$\succsim$	<code>\succsim</code>
$\curlyeqsucc$	<code>\curlyeqsucc</code>	$\multimapdotbothB$	<code>\multimapdotbothB</code>	$\therefore$	<code>\therefore</code>
$\dashV$	<code>\dashV</code>	$\multimapdotbothBvert$	<code>\multimapdotbothBvert</code>	$\thickapprox$	<code>\thickapprox</code>
$\DashV$	<code>\DashV</code>	$\multimapdotbothvert$	<code>\multimapdotbothvert</code>	$\thicksim$	<code>\thicksim</code>
$\dashVv$	<code>\dashVv</code>	$\multimapdotinv$	<code>\multimapdotinv</code>	$\topfork$	<code>\topfork</code>
$\dfourier$	<code>\dfourier</code>	$\multimapinv$	<code>\multimapinv</code>	$\triangleq$	<code>\triangleq</code>
$\Dfourier$	<code>\Dfourier</code>	$\niplus$	<code>\niplus</code>	$\varhash$	<code>\varhash</code>
$\disin$	<code>\disin</code>	$\nisd$	<code>\nisd</code>	$\varisins$	<code>\varisins</code>
$\doteq$	<code>\doteq</code>	$\Perp$	<code>\Perp</code>	$\varnis$	<code>\varnis</code>
$\doteqdot$	<code>\doteqdot</code>	$\pitchfork$	<code>\pitchfork</code>	$\varpropto$	<code>\varpropto</code>
$\dotminus$	<code>\dotminus</code>	$\precapprox$	<code>\precapprox</code>	$\Vdash$	<code>\Vdash</code>
$\dotsim$	<code>\dotsim</code>	$\preccurlyeq$	<code>\preccurlyeq</code>	$\vDash$	<code>\vDash</code>
$\eqbumped$	<code>\eqbumped</code>	$\precnapprox$	<code>\precnapprox</code>	$\VDash$	<code>\VDash</code>
$\eqcirc$	<code>\eqcirc</code>	$\precneqq$	<code>\precneqq</code>	$\veeeq$	<code>\veeeq</code>
$\eqsim$	<code>\eqsim</code>	$\precnsim$	<code>\precnsim</code>	$\Vvdash$	<code>\Vvdash</code>
$\equalparallel$	<code>\equalparallel</code>	$\precsim$	<code>\precsim</code>	$\ztransf$	<code>\ztransf</code>
$\fallingdotseq$	<code>\fallingdotseq</code>	$\prurel$	<code>\prurel</code>	$\Ztransf$	<code>\Ztransf</code>
$\fatbslash$	<code>\fatbslash</code>	$\risingdotseq$	<code>\risingdotseq</code>		

TABLE 112: boisik Negated Binary Relations

$\not\cong$	<code>\ncong</code>	$\not\preceq$	<code>\npreceq</code>	$\not\Vdash$	<code>\nVDash</code>
$\neq$	<code>\neq</code>	$\not\shortmid$	<code>\nshortmid</code>	$\not\Vdash$	<code>\nVdash</code>
$\nequiv$	<code>\nequiv</code>	$\not\shortparallel$	<code>\nshortparallel</code>	$\not\Vdash$	<code>\nvDash</code>
$\nmid$	<code>\nmid</code>	$\not\sim$	<code>\nsim</code>	$\not\Vdash$	<code>\nvDash</code>
$\nparallel$	<code>\nparallel</code>	$\not\succ$	<code>\nsucc</code>		
$\nprec$	<code>\nprec</code>	$\not\succceq$	<code>\nsuccceq</code>		

TABLE 113: stix Binary Relations

$\approx$	<code>\approx</code>	$\#$	<code>\eqvparsl</code>	$\rightarrow$	<code>\rightfishtail</code>
$\approxeq$	<code>\approxeq</code>	$\cdot\cdot$	<code>\fallingdotseq</code>	$\Rightarrow$	<code>\rightimply</code>
$\approxeqq$	<code>\approxeqq</code>	$\blacktriangleright$	<code>\fbowtie</code>	$\succ$	<code>\righttail</code>
$\approxid$	<code>\approxid</code>	$\downarrow$	<code>\forksnot</code>	$\equiv$	<code>\risingdotseq</code>
$\arceq$	<code>\arceq</code>	$\cap$	<code>\forkv</code>	$\sqsubset$	<code>\rsqhook</code>
$\assert$	<code>\assert</code>	$\smile$	<code>\frown</code>	$\sqsupset$	<code>\ruledelayed</code>
$\asteq$	<code>\asteq</code>	$\H$	<code>\gleichstark</code>	$\asymp$	<code>\scurel</code>
$\asymp$	<code>\asymp</code>	$\approx$	<code>\hatapprox</code>	$\shortdowntack$	<code>\shortdowntack</code>
$\backcong$	<code>\backcong</code>	$\bullet\circ$	<code>\imageof</code>	$\shortlefttack$	<code>\shortlefttack</code>
$\backsimeq$	<code>\backsimeq</code>	$\in$	<code>\in</code>	$\shortmid$	<code>\shortmid</code>
$\backsimeq$	<code>\backsimeq</code>	$\dot{\in}$	<code>\isindot</code>	$\shortparallel$	<code>\shortparallel</code>
$\bagmember$	<code>\bagmember</code>	$\in\in$	<code>\isinE</code>	$\shortup tack$	<code>\shortup tack</code>
$\bar{v}$	<code>\Barv</code>	$\in\in\in$	<code>\isinobar</code>	$\sim$	<code>\sim</code>
$\bar{V}$	<code>\barV</code>	$\in\in\in\in$	<code>\isins</code>	$\simeq$	<code>\simeq</code>
$\between$	<code>\between</code>	$\in\in\in\in\in$	<code>\isinvb</code>	$\sim\sim$	<code>\simminussim</code>
$\bNot$	<code>\bNot</code>	$\approx$	<code>\kernelcontraction</code>	$\not\simeq$	<code>\simneqq</code>
$\bowtie$	<code>\bowtie</code>	$\prec$	<code>\leftdbltail</code>	$\simeq$	<code>\simrdots</code>
$\Bumpeq$	<code>\Bumpeq</code>	$\leftarrow$	<code>\leftfishtail</code>	$\smallfrown$	<code>\smallfrown</code>
$\bumpeq$	<code>\bumpeq</code>	$\leftarrow$	<code>\lefttail</code>	$\smallin$	<code>\smallin</code>
$\bumpeqq$	<code>\bumpeqq</code>	$\blacktriangleright$	<code>\lfbowtie</code>	$\smallni$	<code>\smallni</code>
$\cirbot$	<code>\cirbot</code>	$\blacktriangleright$	<code>\lftimes</code>	$\smallsmile$	<code>\smallsmile</code>
$\circeq$	<code>\circeq</code>	$\dash$	<code>\longdashv</code>	$\not\simeq$	<code>\simeq</code>
$\cirmid$	<code>\cirmid</code>	$\sqsubset\sqsupset$	<code>\lsqhook</code>	$\smile$	<code>\smile</code>
$\closure$	<code>\closure</code>	$\sqsubset\sqsupset\sqsubset\sqsupset$	<code>\measeq</code>	$\star$	<code>\stareq</code>
$\coloneq$	<code>\Coloneq</code>	$\mid$	<code>\mid</code>	$\succ$	<code>\succ</code>
$\coloneq$	<code>\coloneq</code>	$\circ$	<code>\midcir</code>	$\gg$	<code>\Succ</code>
$\cong$	<code>\cong</code>	$\pitchfork$	<code>\mlcp</code>	$\approx\approx$	<code>\succapprox</code>
$\congdot$	<code>\congdot</code>	$\multimap$	<code>\models</code>	$\approx\approx\approx$	<code>\succcurlyeq</code>
$\curlyeqprec$	<code>\curlyeqprec</code>	$\multimap$	<code>\multimap</code>	$\approx\approx\approx\approx$	<code>\succeq</code>
$\curlyeqsucc$	<code>\curlyeqsucc</code>	$\multimap$	<code>\multimapinv</code>	$\approx\approx\approx\approx$	<code>\succeqq</code>
$\dashcolon$	<code>\dashcolon</code>	$\exists$	<code>\ni</code>	$\approx\approx\approx\approx$	<code>\succnapprox</code>
$\dashv$	<code>\dashv</code>	$\circ\circ$	<code>\niobar</code>	$\approx\approx\approx\approx$	<code>\succneq</code>
$\dashv$	<code>\dashv</code>	$\circ\circ$	<code>\nis</code>	$\approx\approx\approx\approx$	<code>\succneqq</code>
$\Dashv$	<code>\Dashv</code>	$\exists\exists$	<code>\nisd</code>	$\approx\approx\approx\approx$	<code>\succnsim</code>
$\Dashv$	<code>\Dashv</code>	$\exists\exists$	<code>\Not</code>	$\approx\approx\approx\approx$	<code>\succsim</code>
$\DashVDash$	<code>\DashVDash</code>	$/$	<code>\notchar</code>	$\approx\approx\approx\approx$	<code>\thickapprox</code>
$\dashv$	<code>\dashv</code>	$\bullet\circ$	<code>\origof</code>	$\approx\approx\approx\approx$	<code>\thicksim</code>
$\ddot{\phantom{x}}$	<code>\ddot{\phantom{x}}</code>	$\parallel$	<code>\parallel</code>	$\approx\approx\approx\approx$	<code>\topfork</code>
$\disin$	<code>\disin</code>	$\not\parallel$	<code>\parsim</code>	$\approx\approx\approx\approx$	<code>\upfishtail</code>
$\doteq$	<code>\Doteq</code>	$\perp$	<code>\perp</code>	$\approx\approx\approx\approx$	<code>\upin</code>
$\doteq$	<code>\doteq</code>	$\pitchfork$	<code>\pitchfork</code>	$\approx\approx\approx\approx$	<code>\varisinobar</code>
$\dotequiv$	<code>\dotequiv</code>	$\wedge$	<code>\prec</code>	$\approx\approx\approx\approx$	<code>\varisins</code>

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$\sim$	<code>\dotsim</code>	$\ll$	<code>\Prec</code>	$\bar{\exists}$	<code>\varniobar</code>
$\doteqdot$	<code>\dotsminusdots</code>	$\approx$	<code>\precapprox</code>	$\bar{\exists}$	<code>\varnis</code>
$\downarrow$	<code>\downfishetail</code>	$\asymp$	<code>\preccurlyeq</code>	$\alpha$	<code>\varpropto</code>
$\circ\circ$	<code>\dualmap</code>	$\asymp$	<code>\preceq</code>	$\nexists$	<code>\varVdash</code>
$\#$	<code>\eparsl</code>	$\asymp$	<code>\preceqq</code>	$\doteq$	<code>\vBar</code>
$\#$	<code>\eqcirc</code>	$\asymp$	<code>\precnapprox</code>	$\ddot{\exists}$	<code>\Vbar</code>
$\eqqcolon$	<code>\eqcolon</code>	$\asymp$	<code>\precneq</code>	$\doteq$	<code>\vBarv</code>
$\stackrel{\text{def}}{=}$	<code>\eqdef</code>	$\asymp$	<code>\precneqq</code>	$\nexists$	<code>\Vdash</code>
$\eqdot$	<code>\eqdot</code>	$\asymp$	<code>\precnsim</code>	$\vdash$	<code>\vdash</code>
$\eqqeq$	<code>\eqeq</code>	$\asymp$	<code>\precnsim</code>	$\vDash$	<code>\vDash</code>
$\eqqeqq$	<code>\eqeqq</code>	$\asymp$	<code>\propto</code>	$\nVdash$	<code>\vDash</code>
$\eqqsim$	<code>\eqqsim</code>	$\asymp$	<code>\prurel</code>	$\equiv$	<code>\vDdash</code>
$\eqsim$	<code>\eqsim</code>	$\sqsupset$	<code>\pullback</code>	$\vdots$	<code>\vdots</code>
$\equalparallel$	<code>\equalparallel</code>	$\sqsubset$	<code>\pushout</code>	$\asymp$	<code>\veeeq</code>
$\equiv$	<code>\equiv</code>	$\stackrel{?}{=}$	<code>\questeq</code>	$\bowtie$	<code>\veeonwedge</code>
$\equiv$	<code>\Equiv</code>	$\dagger$	<code>\revnmid</code>	$\mid$	<code>\vertoverlay</code>
$\equiv$	<code>\equivDD</code>	$\blacktriangleright$	<code>\rfbowtie</code>	$\overline{\rule{1pt}{1em}}$	<code>\vlongdash</code>
$\equiv$	<code>\equivVert</code>	$\blacktriangleright$	<code>\rftimes</code>	$\overline{\rule{1pt}{1em}}$	<code>\Vvdash</code>
$\equiv$	<code>\equivVvert</code>	$\rightarrowtail$	<code>\rightdbltail</code>	$\triangleq$	<code>\wedgeeq</code>

stix defines `\owns` as a synonym for `\ni` and `\doteqdot` as a synonym for `\Doteq`.

TABLE 114: stix Negated Binary Relations

$\not\sim$	<code>\forks</code>	$\not\#$	<code>\nhpar</code>	$\not\approx$	<code>\nsime</code>
$\not\doteqdot$	<code>\napprox</code>	$\not\dagger$	<code>\nmid</code>	$\not\asymp$	<code>\nsucc</code>
$\not\asymp$	<code>\napproxeqq</code>	$\not\exists$	<code>\nni</code>	$\not\asymp$	<code>\nsucccurlyeq</code>
$\not\asymp$	<code>\nasymp</code>	$\not\in$	<code>\notinin</code>	$\not\asymp$	<code>\nsucceq</code>
$\not\asymp$	<code>\nBumpeq</code>	$\not\#$	<code>\nparallel</code>	$\not\exists$	<code>\nvarisinobar</code>
$\not\asymp$	<code>\nbumpeq</code>	$\not\star$	<code>\nprec</code>	$\not\exists$	<code>\nvarniobar</code>
$\not\asymp$	<code>\ncong</code>	$\not\star$	<code>\preccurlyeq</code>	$\not\exists$	<code>\nvDash</code>
$\not\asymp$	<code>\ncongdot</code>	$\not\star$	<code>\preceq</code>	$\not\exists$	<code>\nvDash</code>
$\not\asymp$	<code>\ne</code>	$\dagger$	<code>\nshortmid</code>	$\not\exists$	<code>\nVDash</code>
$\not\asymp$	<code>\neqsim</code>	$\not\#$	<code>\nshortparallel</code>	$\not\exists$	<code>\nVdash</code>
$\not\asymp$	<code>\nequiv</code>	$\approx$	<code>\nsim</code>		

stix defines `\neq` as a synonym for `\ne`, `\nsimeq` as a synonym for `\nsime`, and `\nforksnnot` as a synonym for `\forks`.

TABLE 115: mathtools Binary Relations

$\approx$	<code>\Colonapprox</code>	$\vdash$	<code>\coloneq</code>	$\dashv$	<code>\Eqcolon</code>
$\approx$	<code>\colonapprox</code>	$\sim$	<code>\colonsim</code>	$=:$	<code>\eqqcolon</code>
$\coloneqq$	<code>\coloneqq</code>	$\colonapprox$	<code>\Colonsim</code>	$=::$	<code>\Eqqcolon</code>
$\coloneqq$	<code>\Coloneqq</code>	$\vdash\vdash$	<code>\dblcolon</code>		
$\vdash\vdash$	<code>\Coloneq</code>	$\vdash$	<code>\eqcolon</code>		

Similar symbols can be defined using `mathtools`'s `\vcentscolon`, which produces a colon centered on the font's math axis:

$$\text{=:} \quad \text{vs.} \quad \text{=:}\text{\vcentscolon}$$

TABLE 116: turnstile Binary Relations

	<code>\dddtstile{abc}{def}</code>		<code>\nntstile{abc}{def}</code>		<code>\stdtstile{abc}{def}</code>
	<code>\ddststile{abc}{def}</code>		<code>\nnttstile{abc}{def}</code>		<code>\stststile{abc}{def}</code>
	<code>\ddtstile{abc}{def}</code>		<code>\nsdtstile{abc}{def}</code>		<code>\sttstile{abc}{def}</code>
	<code>\ddttstile{abc}{def}</code>		<code>\nsststile{abc}{def}</code>		<code>\stttstile{abc}{def}</code>
	<code>\ndntstile{abc}{def}</code>		<code>\nststile{abc}{def}</code>		<code>\tddtstile{abc}{def}</code>
	<code>\dnststile{abc}{def}</code>		<code>\nstattstile{abc}{def}</code>		<code>\tddststile{abc}{def}</code>
	<code>\dntstile{abc}{def}</code>		<code>\ntdtstile{abc}{def}</code>		<code>\tdtstile{abc}{def}</code>
	<code>\dnntstile{abc}{def}</code>		<code>\ntststile{abc}{def}</code>		<code>\tdttsstile{abc}{def}</code>
	<code>\dsdtstile{abc}{def}</code>		<code>\nttstile{abc}{def}</code>		<code>\tnadtstile{abc}{def}</code>
	<code>\dsststile{abc}{def}</code>		<code>\ntttstile{abc}{def}</code>		<code>\tnaststile{abc}{def}</code>
	<code>\dststile{abc}{def}</code>		<code>\sddtstile{abc}{def}</code>		<code>\tnatstile{abc}{def}</code>
	<code>\dstattstile{abc}{def}</code>		<code>\sdststile{abc}{def}</code>		<code>\tnattstile{abc}{def}</code>

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	\dtdtstile{abc}{def}		\sdtstile{abc}{def}		\tsdtstile{abc}{def}
	\dtststile{abc}{def}		\sdttstile{abc}{def}		\tsststile{abc}{def}
	\dttstile{abc}{def}		\sndtstile{abc}{def}		\tststile{abc}{def}
	\dtttstile{abc}{def}		\snststile{abc}{def}		\tsttstile{abc}{def}
	\nddtstile{abc}{def}		\sntstile{abc}{def}		\ttdtstile{abc}{def}
	\ndststile{abc}{def}		\snttstile{abc}{def}		\ttststile{abc}{def}
	\ndtstile{abc}{def}		\ssdtstile{abc}{def}		\tttstile{abc}{def}
	\ndttstile{abc}{def}		\ssststile{abc}{def}		\ttttstile{abc}{def}
	\nndtstile{abc}{def}		\sststile{abc}{def}		
	\nnststile{abc}{def}		\ssttstile{abc}{def}		

Each of the above takes an optional argument that controls the size of the upper and lower expressions. See the `turnstile` documentation for more information.

TABLE 117: `trsym` Binary Relations

 \InversTransformHoriz	 \TransformHoriz
 \InversTransformVert	 \TransformVert

TABLE 118: `trfsigns` Binary Relations

 \dfourier	 \Dfourier
 \fourier	 \Fourier
 \laplace	 \Laplace
 \ztransf	 \Ztransf

TABLE 119: pdfMsym Binary Relations

$\Leftarrow$	<code>\leftPP</code>	$\sqsubset$	<code>\longroundedarrow</code>	$\circlearrowleft$	<code>\roundedarrow</code>
$\Longleftarrow$	<code>\longleftPP</code>	$\sqsubseteq$	<code>\longssquaredarrow</code>	$\sqsupseteq$	<code>\ssquaredarrow</code>
$\Rrightarrow$	<code>\longrightPP</code>	$\Rightarrow$	<code>\rightPP</code>		

pdfMsym symbols are implemented with PDF literals instead of (or sometimes in conjunction) with a font. All symbols can be rendered by pdfL<sup>A</sup>T<sub>E</sub>X and LuaL<sup>A</sup>T<sub>E</sub>X, some by X<sub>L</sub>A<sup>A</sup>T<sub>E</sub>X, and none by most other T<sub>E</sub>X backends.

TABLE 120: cmll Binary Relations

$\circ$	<code>\coh</code>	$\curvearrowleft$	<code>\scoh</code>
$\asymp$	<code>\incoh</code>	$\curvearrowleft\curvearrowright$	<code>\sincoh</code>
$\perp\!\!\!\perp$	<code>\Perp</code>	$\curvearrowleft\curvearrowright\curvearrowleft\curvearrowright$	<code>\simperp</code>
$\multimap$	<code>\multimapboth</code>		

TABLE 121: colonequals Binary Relations

$\approx:$	<code>\approxcolon</code>	$::-$	<code>\coloncolonminus</code>	$=::$	<code>\equalscoloncolon</code>
$\approx::$	<code>\approxcoloncolon</code>	$::\sim$	<code>\coloncolon\sim</code>	$-:$	<code>\minuscolon</code>
$::\approx$	<code>\colonapprox</code>	$::=$	<code>\colonequals</code>	$--::$	<code>\minuscoloncolon</code>
$::$	<code>\coloncolon</code>	$::-$	<code>\colonminus</code>	$:$	<code>\ratio</code>
$::\approx$	<code>\coloncolonapprox</code>	$::\sim$	<code>\colon\sim</code>	$\sim:$	<code>\simcolon</code>
$::=:$	<code>\coloncolon\colonequals</code>	$::=$	<code>\equalscolon</code>	$\sim::$	<code>\simcoloncolon</code>

TABLE 122: fourier Binary Relations

# `\nparallelslant` // `\parallelslant`

TABLE 123: logix Binary Relations

$\equiv$	<code>\ClsEquiv</code>	$\not\equiv$	<code>\NotClsEquiv</code>	$\not\prec$	<code>\NotPre</code>	$\prec$	<code>\Pre</code>
$\supset$	<code>\ClsImpl</code>	$\not\supset$	<code>\NotClsImpl</code>	$\not\preccurlyeq$	<code>\NotPreq</code>	$\preccurlyeq$	<code>\Preq</code>
$\Vdash$	<code>\Conseq</code>	$\not\Vdash$	<code>\NotConseq</code>	$\not\preccurlyeq$	<code>\NotRule</code>	$\vdash$	<code>\Rule</code>
$\Vdash\!\!$	<code>\DTrpTurn</code>	$\not\Vdash\!\!$	<code>\NotDTrpTurn</code>	$\not\preccurlyeq$	<code>\NotSeq</code>	$\succ$	<code>\Seq</code>
$\approx$	<code>\DTurnDWavy</code>	$\not\approx$	<code>\NotDTurnDWavy</code>	$\not\preccurlyeq$	<code>\NotSuc</code>	$\succ$	<code>\Suc</code>
$\Vdash$	<code>\DTurnWavy</code>	$\not\Vdash$	<code>\NotDTurnWavy</code>	$\not\preccurlyeq$	<code>\NotSucq</code>	$\succeq$	<code>\Sucq</code>
$\models$	<code>\Model</code>	$\not\models$	<code>\NotModel</code>	$\not\preccurlyeq$	<code>\NotTrpTurn</code>	$\equiv$	<code>\TrpTurn</code>
$\multimap$	<code>\MulMap</code>	$\not\multimap$	<code>\NotMulMap</code>	$\not\preccurlyeq$	<code>\NotTurn</code>	$\Vdash\!\!$	<code>\Turn</code>
$\multimap\!\!$	<code>\MulMapDual</code>	$\not\multimap\!\!$	<code>\NotMulMapDual</code>	$\not\approx$	<code>\NotTurnDWavy</code>	$\approx$	<code>\TurnDWavy</code>
$\multimap$	<code>\MulMapInv</code>	$\not\multimap$	<code>\NotMulMapInv</code>	$\not\approx$	<code>\NotTurnWavy</code>	$\succ$	<code>\TurnWavy</code>

logix requires either LuaL<sup>A</sup>T<sub>E</sub>X or X<sub>L</sub>A<sup>A</sup>T<sub>E</sub>X.

TABLE 124: *logix* Set Symbols

$\in$	<code>\In</code>	$\not\in$	<code>\NotOwns</code>	:	<code>\Of</code>	$\emptyset$	<code>\VoidBunch</code>
$\notin$	<code>\NotIn</code>	$\emptyset$	<code>\NullSet</code>	$\ni$	<code>\Owns</code>		

*logix* requires either *Lua<sup>T</sup>E<sub>X</sub>* or *X<sub>PL</sub><sup>T</sup>E<sub>X</sub>*.

TABLE 125: Subset and Superset Relations

$\sqsubset$	<code>\sqsubset</code>	$\sqsupseteq$	<code>\sqsupseteq</code>	$\supset$	<code>\supset</code>
$\sqsubseteq$	<code>\sqsubseteq</code>	$\subset$	<code>\subset</code>	$\supseteq$	<code>\supseteq</code>
$\sqsupset$	<code>\sqsupset</code>	$\sqsubseteq$	<code>\sqsubseteq</code>		

\* Not predefined by the *L<sup>A</sup>T<sub>E</sub>X 2<sub><</sub>* core. Use the *latexsym* package to expose this symbol.

TABLE 126: *AMS* Subset and Superset Relations

$\not\sqsubset$	<code>\nsubset</code>	$\sqsubseteq$	<code>\subseteq</code>	$\sqsupseteq$	<code>\supseteq</code>	$\supsetneqq$	<code>\supsetneqq</code>
$\not\sqsupseteq$	<code>\nsupseteq</code>	$\sqsubset$	<code>\subset</code>	$\sqsupsetneqq$	<code>\supsetneqq</code>	$\varsubsetneqq$	<code>\varsubsetneqq</code>
$\not\sqsupsetneqq$	<code>\nsupsetneqq</code>	$\sqsupsetneqq$	<code>\supsetneqq</code>	$\varsupsetneqq$	<code>\varsupsetneqq</code>		
$\sqsubset$	<code>\sqsubset</code>	$\sqsupset$	<code>\sqsupset</code>	$\varsupsetneq$	<code>\varsupsetneq</code>		
$\sqsupset$	<code>\sqsupset</code>	$\sqsubseteq$	<code>\sqsubseteq</code>	$\varsubsetneq$	<code>\varsubsetneq</code>		
$\Subset$	<code>\Subset</code>	$\Supset$	<code>\Supset</code>	$\varsupsetneqq$	<code>\varsupsetneqq</code>		

TABLE 127: *stmaryrd* Subset and Superset Relations

$\Subsetplus$	<code>\subsetplus</code>	$\Supsetplus$	<code>\supsetplus</code>
$\Subsetplusseq$	<code>\subsetplusseq</code>	$\Supsetplusseq$	<code>\supsetplusseq</code>

TABLE 128: *wasysym* Subset and Superset Relations

$\sqsubset$	<code>\sqsubset</code>	$\sqsupset$	<code>\sqsupset</code>
-------------	------------------------	-------------	------------------------

TABLE 129: *txfonts/pxfonts* Subset and Superset Relations

$\not\sqsubset$	<code>\nsqsubset</code>	$\not\sqsupseteq$	<code>\nsqsupseteq</code>	$\not\sqsupset$	<code>\nSupset</code>
$\not\sqsubseteq$	<code>\nsqsubseteq</code>	$\not\sqsupsetneqq$	<code>\nsupsetneqq</code>	$\not\sqsubset$	<code>\nsubset</code>
$\not\sqsupset$	<code>\nsqsupset</code>	$\not\sqsubseteq$	<code>\nsubseteq</code>		

TABLE 130: mathabx Subset and Superset Relations

\nsqsubset	\nsupset	\sqsupseteq	\supseteq
\nsqSubset	\nSupset	\sqsupseteqq	\supseteqqq
\nsqsubseteq	\nsupseteq	\sqsupsetneq	\supsetneq
\nsqsubseteqq	\nsupseteqq	\sqsupsetneqq	\supsetneqq
\nsqsupset	\sqsubset	\subset	\varsqsubsetneq
\nsqSupset	\sqSubset	\Subset	\varsqsubsetneqq
\nsqsupseteq	\sqsubseteq	\subseteq	\varsqsupsetneq
\nsqsupseteqq	\sqsubseteqq	\subseteqq	\varsqsupsetneqq
\nsubset	\sqsubsetneq	\subsetneq	\varsubsetneq
\nSubset	\sqsubsetneqq	\subsetneqq	\varsubsetneqq
\nsubseteq	\sqSupset	\supset	\varsupsetneq
\nsubseteqq	\sqSupset	\Supset	\varsupsetneqq

TABLE 131: MnSymbol Subset and Superset Relations

$\nSqsubset$	$\nsubseteq$	$\nsubseteq$	$\nsubseteqq$	$\sqsubset$	$\sqsubsetneq$	$\sqsubseteq$	$\sqsubseteqq$
$\nsqsubset$	$\nsubseteqq$	$\nsubseteqqq$	$\nsubseteqqq$	$\sqsubset$	$\sqsubsetneqq$	$\sqsubseteq$	$\sqsubseteqqq$
$\nSqsubseteq$	$\nexists$	$\nSupset$	$\nexists$	$\Sqsupset$	$\nexists$	$\subset$	$\subsetneq$
$\nSqsubseteqq$	$\nexists$	$\nsupset$	$\nexists$	$\sqsupset$	$\nexists$	$\subseteq$	$\subseteqneqq$
$\nSqsupset$	$\nexists$	$\nsupseteq$	$\nexists$	$\sqsupseteq$	$\nexists$	$\supset$	$\supsetneq$
$\nsqsupset$	$\nexists$	$\nsupseteqq$	$\nexists$	$\sqsupseteqq$	$\nexists$	$\supseteq$	$\supsetneqq$
$\nSqsupseteq$	$\nexists$	$\Sqsubset$	$\nexists$	$\sqsupseteqq$	$\nexists$	$\supseteq$	$\supsetneq$
$\nSqsupseteqq$	$\nexists$	$\nsqsubset$	$\nexists$	$\sqsupsetneqq$	$\nexists$	$\supseteqq$	$\supsetneqq$
$\nSubset$	$\nexists$	$\nsqsubseteq$	$\nexists$	$\Subset$	$\nexists$	$\supsetneq$	$\supsetneqq$
$\nsubset$	$\nexists$	$\nsqsubseteqq$	$\nexists$	$\subset$	$\nexists$	$\supsetneqq$	$\supsetneqq$

MnSymbol additionally defines `\varsubsetneq` as a synonym for `\subsetneq`, `\varsubsetneqq` as a synonym for `\subsetneqq`, `\varsupsetneq` as a synonym for `\supsetneq`, and `\varsupsetneqq` as a synonym for `\supsetneqq`.

TABLE 132: fdsymbol Subset and Superset Relations

⊄	\nsqsubset	⊈	\nsubseteq	⊏	\sqsubsetneq	⊆	\subsetneq
⊉	\nSqsubset	⊉	\nsubseteqq	⊐	\sqsubsetneqq	⊑	\subsetneqq
⊉	\nsqsubseteq	⊉	\nsupset	⊓	\sqsupset	⊔	\subsetneq
⊉	\nsqsubseteqq	⊉	\nSupset	⊓	\Sqsupset	⊔	\subsetneqq
⊉	\nsqsupset	⊉	\nsupseteq	⊓	\sqsupseteq	⊔	\supset
⊉	\nSqsupset	⊉	\nsupseteqq	⊓	\sqsupseteqq	⊔	\Supset
⊉	\nsqsupseteq	⊉	\sqsubsetset	⊓	\sqsupsetneq	⊔	\supseteq
⊉	\nsqsupseteqq	⊉	\Sqsubset	⊓	\sqsupsetneqq	⊔	\supseteqq
⊋	\nssubset	⊋	\sqsubsetseteq	⊎	\subset	⊌	\supsetneq
⊋	\nSubset	⊋	\sqsubsetseteqq	⊎	\Subset	⊌	\supsetneqq

fdsymbol additionally defines \varsubsetneqq as a synonym for \subsetneqq, \varsubsetneq as a synonym for \subsetneq, \varsupsetneqq as a synonym for \supsetneqq, and \varsupsetneq as a synonym for \supsetneq.

TABLE 133: boisik Subset and Superset Relations

⊄	\nssubset	⊋	\sqsubset	⊎	\subsetplus	⊌	\supsetplus
⊉	\nssubseteq	⊉	\sqSupset	⊎	\subsetplus	⊌	\varsubsetneqq
⊉	\nssubseteqq	⊉	\sqsupset	⊎	\Supset	⊌	\varsubsetneqq
⊉	\nsupset	⊉	\Subset	⊎	\supseteqq	⊌	\varsupsetneq
⊉	\nsupseteq	⊉	\subsetset	⊎	\supsetneq	⊌	\varsupsetneqq
⊉	\nsupseteqq	⊉	\subsetseteq	⊎	\supsetneqq	⊌	\varsupsetneqq
⊎	\sqsubsetset	⊎	\subsetsetneq	⊎	\supsetplus	⊌	

TABLE 134: stix Subset and Superset Relations

⊍	\bsolhsub	⊎	\sqsupseteq	⊎	\suphsub
⊎	\csub	⊎	\sqsupsetneq	⊎	\suplarr
⊎	\csube	⊎	\subdot	⊎	\supmult
⊎	\csup	⊎	\submult	⊎	\Supset
⊎	\csupe	⊎	\subrarr	⊎	\supset
⊎	\leftarrowsubset	⊎	\Subset	⊎	\supsetapprox
⊉	\nsqsubset	⊉	\subset	⊎	\supsetcirc*
⊉	\nsqsubseteq	⊉	\subsetapprox	⊎	\supsetdot
⊉	\nsqsupset	⊉	\subsetcirc*	⊎	\supseteq
⊉	\nsqsupseteq	⊉	\subsetdot	⊎	\supseteqq
⊋	\nssubset	⊋	\subseteq	⊎	\supsetneq

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$\subseteq$	<code>\nsubseteq</code>	$\sqsubseteq$	<code>\subsetneqq</code>	$\supseteq$	<code>\supsetneqq</code>
$\subsetneq$	<code>\nsubseteqq</code>	$\sqsubset$	<code>\subsetneq</code>	$\supsetplus$	<code>\supsetplus</code>
$\supset$	<code>\nsupset</code>	$\sqsupset$	<code>\subsetneqq</code>	$\supsim$	<code>\supsim</code>
$\supseteq$	<code>\nsupseteq</code>	$\sqsupseteq$	<code>\subsetneqq</code>	$\supsub$	<code>\supsub</code>
$\supsetneq$	<code>\nsupseteqq</code>	$\sqsupsetneq$	<code>\subsetneq</code>	$\supsup$	<code>\supsup</code>
$\rightarrowtail$	<code>\rightarrowsupset</code>	$\sqsupsettail$	<code>\subsetneqq</code>	$\varsubsetneq$	<code>\varsubsetneqq</code>
$\sqsubset$	<code>\sqssubset</code>	$\sqsupset$	<code>\subsetneqq</code>	$\varsubsetneqq$	<code>\varsubsetneqq</code>
$\sqsupset$	<code>\sqssubsetneq</code>	$\sqsupsetneq$	<code>\subsetneqq</code>	$\varsupsetneq$	<code>\varsupsetneq</code>
$\sqsupseteq$	<code>\sqssubseteq</code>	$\sqsupseteq$	<code>\subsetneqq</code>	$\varsupsetneqq$	<code>\varsupsetneqq</code>
$\sqsupsettail$	<code>\sqssubsetneq</code>	$\sqsupsettail$	<code>\subsetneqq</code>	$\varsupsetneqq$	<code>\varsupsetneqq</code>
$\sqsupseteqtail$	<code>\sqssubseteq</code>	$\sqsupseteqtail$	<code>\subsetneqq</code>	$\varsupsetneqq$	<code>\varsupsetneqq</code>

\* Defined as an ordinary character, not as a binary relation.

TABLE 135: logix Subset and Superset Relations

$\Subset$	$\backslash FntSbset$	$\notin$	$\backslash NotStrctFntSbset$	$\not\models$	$\backslash NotWkSbnch$	$\sqsubset$	$\backslash StrctSbmap$
$\nsubseteq$	$\backslash NotFntSbset$	$\not\models$	$\backslash NotStrctSbmap$	$\not\models$	$\backslash Sbmap$	$\sqsubset$	$\backslash StrctSbnch$
$\not\subseteq$	$\backslash NotSbmap$	$\not\models$	$\backslash NotStrctSbnch$	$\not\models$	$\backslash Sbnch$	$\sqsubset$	$\backslash StrctSbset$
$\not\models$	$\backslash NotSbnch$	$\not\models$	$\backslash NotStrctSbset$	$\models$	$\backslash Sbset$	$\sqsubseteq$	$\backslash StrctWkSbnch$
$\not\models$	$\backslash NotSbset$	$\not\models$	$\backslash NotStrctWkSbnch$	$\models$	$\backslash StrctFntSbset$	$\sqsubseteq$	$\backslash WkSbnch$

`logix` requires either `LuaLaTeX` or `XeLaTeX`.

TABLE 136: Inequalities

```
> \geq \gg \leq \leq \ll \ll \neq \neq
```

TABLE 137: *AMS* Inequalities

$\geqslant$	<code>\eqslantgtr</code>	$\gtreqdot$	<code>\lesseqtr</code>	$\not\geq$	<code>\ngeq</code>
$\leqslant$	<code>\eqslantless</code>	$\gtreqless$	<code>\lesseqgtr</code>	$\not\leq$	<code>\ngeqq</code>
$\geqq$	<code>\geqq</code>	$\gtreqqless$	<code>\lessgtr</code>	$\not\geqslant$	<code>\ngeqslant</code>
$\leqslant$	<code>\geqslant</code>	$\gtreqless$	<code>\lesssim</code>	$\not\geqslant$	<code>\ngtr</code>
$\approx$	<code>\ggg</code>	$\gtreqsim$	<code>\lll</code>	$\not\approx$	<code>\nleq</code>
$\approxeq$	<code>\gnapprox</code>	$\gvertneqq$	<code>\lnapprox</code>	$\not\approx$	<code>\nleqq</code>
$\not\equiv$	<code>\gneq</code>	$\leqq$	<code>\lneq</code>	$\not\equiv$	<code>\nleqslant</code>
$\not\approx$	<code>\gneqq</code>	$\leqslant$	<code>\lneqq</code>	$\not\approx$	<code>\nless</code>
$\approx$	<code>\gnsim</code>	$\lessapprox$	<code>\lnsim</code>		
$\approx\approx$	<code>\gtrapprox</code>	$\lessdot$	<code>\lvertneqq</code>		

TABLE 138: `wasysym` Inequalities
 $\gtrapprox \backslash apprge \quad \lessapprox \backslash apprle$ 
TABLE 139: `txfonts/pxfonts` Inequalities

$\gg$	<code>\ngg</code>	$\ngtrsim$	<code>\ngtrsim</code>
$\ngtrapprox$	<code>\ngtrapprox</code>	$\nlessapprox$	<code>\nlessapprox</code>
$\ngtrless$	<code>\ngtrless</code>	$\nlessgtr$	<code>\nlessgtr</code>

TABLE 140: `mathabx` Inequalities

$\geqslant$	<code>\eqslantgtr</code>	$\geqslantless$	<code>\gtreqless</code>	$\lesssim$	<code>\lesssim</code>	$\ngtr$	<code>\ngtr</code>
$\leqslant$	<code>\eqslantless</code>	$\geqslantless$	<code>\gtreqless</code>	$\ll$	<code>\ll</code>	$\ngtrapprox$	<code>\ngtrapprox</code>
$\geq$	<code>\geq</code>	$\geqless$	<code>\gtreqless</code>	$\lll$	<code>\lll</code>	$\ngtrsim$	<code>\ngtrsim</code>
$\leq$	<code>\leqq</code>	$\leqless$	<code>\gtreqless</code>	$\approx\!\!\!/\!$	<code>\lnapprox</code>	$\nleq$	<code>\nleq</code>
$>$	<code>\gg</code>	$\geqslantless$	<code>\gvertneqq</code>	$\leqslant$	<code>\lneq</code>	$\nleqq$	<code>\nleqq</code>
$>$	<code>\ggg</code>	$\geqslantless$	<code>\leq</code>	$\leqslant$	<code>\lneqq</code>	$\nless$	<code>\nless</code>
$\approx\!\!\!/\!$	<code>\gnapprox</code>	$\leqslant$	<code>\leq</code>	$\approx\!\!\!/\!$	<code>\lnsim</code>	$\nlessapprox$	<code>\nlessapprox</code>
$\approx\!\!\!/\!$	<code>\gneq</code>	$\leqslant$	<code>\lessapprox</code>	$\approx\!\!\!/\!$	<code>\lvertneqq</code>	$\nlesssim$	<code>\nlesssim</code>
$\approx\!\!\!/\!$	<code>\gneqq</code>	$\lessdot$	<code>\eqslantgtr</code>	$\not\approx\!\!\!/\!$	<code>\neqslantgtr</code>	$\nvargeq$	<code>\nvargeq</code>
$\approx\!\!\!/\!$	<code>\gnsim</code>	$\lessdot$	<code>\eqslantless</code>	$\not\approx\!\!\!/\!$	<code>\neqslantless</code>	$\nvarleq$	<code>\nvarleq</code>
$\approx\!\!\!/\!$	<code>\gtrapprox</code>	$\lessdot$	<code>\eqslantgtr</code>	$\not\approx\!\!\!/\!$	<code>\ngeq</code>	$\vargeq$	<code>\vargeq</code>
$>$	<code>\gtrdot</code>	$\lessdot$	<code>\eqslantless</code>	$\not\approx\!\!\!/\!$	<code>\ngeqq</code>	$\varleq$	<code>\varleq</code>

`mathabx` defines `\leqslant` and `\le` as synonyms for `\leq`, `\geqslant` and `\ge` as synonyms for `\geq`, `\nleqslant` as a synonym for `\nleq`, and `\ngeqslant` as a synonym for `\ngeq`.

TABLE 141: MnSymbol Inequalities

$\geqslantgt$	$\leqslantgtr$	$\geqslantless$	$\leqslantgtreqless$	$\lesssim$	$\lessapprox$	$\gtreqless$	$\gtreqless$
$\leqslantlt$	$\geqslantgt$	$\geqslantless$	$\geqslantgtreqless$	$\ll$	$\lll$	$\gtreqless$	$\gtreqless$
$\geqeq$	$\geqclosed$	$\geqq$	$\geqneqq$	$\lll$	$\llll$	$\gtreqless$	$\gtreqless$
$\geqclosed$	$\geqclosed$	$\geqsim$	$\geqsim$	$\approx$	$\lnapprox$	$\gtreqless$	$\gtreqless$
$\geqdot$	$\geqdot$	$\leqeq$	$\leqeq$	$\not\leq$	$\lneqq$	$\nleq$	$\nleq$
$\geqq$	$\geqq$	$\leqclosed$	$\leqclosed$	$\not\approx$	$\lnsim$	$\nleqclosed$	$\nleqclosed$
$\geqslant$	$\geqslant$	$\leqdot$	$\leqdot$	$\not\approx$	$\neqslantgt$	$\nleqdot$	$\nleqdot$
$\geqslantdot$	$\geqslantdot$	$\leqq$	$\leqq$	$\not\approx$	$\neqslantless$	$\nleqq$	$\nleqq$
$\gg$		$\leqslant$	$\leqslant$	$\not\approx$	$\ngeq$	$\nleqslant$	$\nleqslant$
$\ggg$		$\leqslantdot$	$\leqslantdot$	$\not\approx$	$\ngeqclosed$	$\nleqslantdot$	$\nleqslantdot$
$\gnapprox$		$<$	$\less$	$\not\approx$	$\ngeqdot$	$\nless$	$\nless$
$\gneqq$		$\lessapprox$	$\lessapprox$	$\not\approx$	$\ngeqq$	$\nlessclosed$	$\nlessclosed$
$\gnsim$		$\lessclosed$	$\lessclosed$	$\not\approx$	$\ngeqslant$	$\nlessdot$	$\nlessdot$
$\gtr$		$\lessdot$	$\lessdot$	$\not\approx$	$\ngeqslantdot$	$\nlesseqgtr$	$\nlesseqgtr$
$\gtrapprox$		$\lesseqgtr$	$\lesseqgtr$	$\gg$	$\ngg$	$\nlesseqgtrslant$	$\nlesseqgtrslant$
$\gtrclosed$		$\lesseqgtrslant$	$\lesseqgtrslant$	$\ggg$	$\nggg$	$\nlesseqgqtr$	$\nlesseqgqtr$
$\gtrdot$		$\lesseqgqtr$	$\lesseqgqtr$	$\gg$	$\ngtr$	$\nlessgtr$	$\nlessgtr$
$\gtreqless$		$\lessgtr$	$\lessgtr$	$\gg$	$\ngtrclosed$	$\nll$	$\nll$
$\gtreqless$		$\lessneqqgtr$	$\lessneqqgtr$	$\gg$	$\ngtrdot$	$\nlll$	$\nlll$

MnSymbol additionally defines synonyms for some of the preceding symbols:

$\gggtr$	$\geqslantgt$	(same as $\ggg$ )
$\gvertneqq$	$\geqneqq$	(same as $\gvertneqq$ )
$\lhd$	$\geqclosed$	(same as $\lhd$ )
$\lll$	$\geqq$	(same as $\lll$ )
$\lvertneqq$	$\geqneqq$	(same as $\lvertneqq$ )
$\trianglelefteq$	$\geqclosed$	(same as $\trianglelefteq$ )
$\triangleleft$	$\geqq$	(same as $\triangleleft$ )
$\trianglerighteq$	$\geqclosed$	(same as $\trianglerighteq$ )
$\trianglelefteq$	$\geqclosed$	(same as $\trianglelefteq$ )
$\triangleleft$	$\geqclosed$	(same as $\triangleleft$ )
$\rhd$	$\geqclosed$	(same as $\rhd$ )
$\trianglelefteq$	$\geqclosed$	(same as $\trianglelefteq$ )
$\trianglerighteq$	$\geqclosed$	(same as $\trianglerighteq$ )
$\unlhd$	$\geqclosed$	(same as $\unlhd$ )
$\unrhd$	$\geqclosed$	(same as $\unrhd$ )
$\vartriangleleft$	$\geqq$	(same as $\vartriangleleft$ )
$\vartriangleright$	$\geqclosed$	(same as $\vartriangleright$ )

TABLE 142: `fdsymbol` Inequalities

$\geq$	<code>\eqslantgtr</code>	$\leq$	<code>\eqslantdot</code>	$\not\equiv$	<code>\ngtrapprox</code>
$\leq$	<code>\eqslantless</code>	$\geq$	<code>\eqslcc</code>	$\not\leq$	<code>\ngtrcc</code>
$\geq$	<code>\geq</code>	$<$	<code>\less</code>	$\not\geq$	<code>\ngtrclosed</code>
$\sqsupseteq$	<code>\geqclosed</code>	$\lessapprox$	<code>\lessapprox</code>	$\not\sqsupseteq$	<code>\ngtrdot</code>
$\sqsupseteq$	<code>\geqdot</code>	$\triangleleft$	<code>\lesscc</code>	$\not\sqsupseteq$	<code>\ngtreqless</code>
$\sqsupseteqq$	<code>\geqq</code>	$\triangleleft$	<code>\lessclosed</code>	$\not\sqsupseteqq$	<code>\ngtreqqless</code>
$\geq$	<code>\geqlant</code>	$\lessdot$	<code>\lessdot</code>	$\not\geq$	<code>\ngtreqslantless</code>
$\geq$	<code>\geqlantdot</code>	$\lessapprox$	<code>\lesseqgtr</code>	$\not\geq$	<code>\ngtrless</code>
$\geq$	<code>\geqlcc</code>	$\lessapprox$	<code>\lesseqgtr</code>	$\not\geq$	<code>\ngtrsim</code>
$\gg$	<code>\gg</code>	$\lessapprox$	<code>\lesseqslantgtr</code>	$\not\geq$	<code>\nleq</code>
$\ggg$	<code>\ggg</code>	$\lessapprox$	<code>\lessgtr</code>	$\not\geq$	<code>\nleqclosed</code>
$\gtrapprox$	<code>\gnapprox</code>	$\lessapprox$	<code>\lessim</code>	$\not\geq$	<code>\nleqdot</code>
$\gtrless$	<code>\gneq</code>	$\ll$	<code>\ll</code>	$\not\geq$	<code>\nleqq</code>
$\gtrless$	<code>\gneqq</code>	$\lll$	<code>\lll</code>	$\not\geq$	<code>\nleqlant</code>
$\gtrless$	<code>\gnsim</code>	$\lessapprox$	<code>\lnapprox</code>	$\not\geq$	<code>\nleqlantdot</code>
$\gtreqless$	<code>\gtr</code>	$\lessapprox$	<code>\lneq</code>	$\not\geq$	<code>\nleqlcc</code>
$\gtreqless$	<code>\gtreqless</code>	$\lessapprox$	<code>\lneqq</code>	$\not\geq$	<code>\nless</code>
$\gtreqless$	<code>\gtrcc</code>	$\lessapprox$	<code>\lnsim</code>	$\not\geq$	<code>\nlessapprox</code>
$\gtreqless$	<code>\gtrclosed</code>	$\lessapprox$	<code>\neqlantgtr</code>	$\not\geq$	<code>\nlesscc</code>
$\gtreqless$	<code>\gtrdot</code>	$\lessapprox$	<code>\neqlantless</code>	$\not\geq$	<code>\nlessclosed</code>
$\gtreqless$	<code>\gtreqless</code>	$\lessapprox$	<code>\ngeq</code>	$\not\geq$	<code>\nlessdot</code>
$\gtreqless$	<code>\gtreqqless</code>	$\lessapprox$	<code>\ngeqclosed</code>	$\not\geq$	<code>\nlesseqgtr</code>
$\gtreqless$	<code>\gtreqslantless</code>	$\lessapprox$	<code>\ngeqdot</code>	$\not\geq$	<code>\nlesseqgtr</code>
$\gtreqless$	<code>\gtreqslant</code>	$\lessapprox$	<code>\ngeqq</code>	$\not\geq$	<code>\nlesseqslantgtr</code>
$\gtreqless$	<code>\gtreqslantdot</code>	$\lessapprox$	<code>\ngeqslant</code>	$\not\geq$	<code>\nlessgtr</code>
$\leq$	<code>\leq</code>	$\lessapprox$	<code>\ngeqslantdot</code>	$\not\geq$	<code>\nlesssim</code>
$\leq$	<code>\leqclosed</code>	$\lessapprox$	<code>\ngeqslcc</code>	$\not\geq$	<code>\nll</code>
$\leq$	<code>\leqdot</code>	$\lessapprox$	<code>\ngg</code>	$\not\geq$	<code>\nlll</code>
$\leq$	<code>\leqq</code>	$\lessapprox$	<code>\nggg</code>		
$\leq$	<code>\leqlant</code>	$\lessapprox$	<code>\ngtr</code>		

`fdsymbol` defines synonyms for some of the preceding symbols:

$\geq$	<code>\ge</code>	$\leq$	<code>\lesdot</code>	$\not\geq$	<code>\ngtcc</code>
$\geq$	<code>\gescc</code>	$\lessapprox$	<code>\lesg</code>	$\not\geq$	<code>\ngtreqlesslant</code>

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$\geq$	<code>\gesdot</code>	$\leqq$	<code>\lesseqgtrslant</code>	$\not\leq$	<code>\nlescc</code>
$\lessapprox$	<code>\gesl</code>	$\triangleleft$	<code>\lhd</code>	$\not\leq$	<code>\nlesdot</code>
$\ggg$	<code>\gggtr</code>	$\lll$	<code>\llless</code>	$\not\leq$	<code>\nlesg</code>
$\triangleright$	<code>\gtcc</code>	$\triangleleft$	<code>\ltcc</code>	$\not\leq$	<code>\nlesseqgtrslant</code>
$\lessapprox$	<code>\gtreqlesslslant</code>	$\not\leq$	<code>\lvertneqq</code>	$\not\leq$	<code>\nltcc</code>
$\not\geq$	<code>\gvertneqq</code>	$\not\leq$	<code>\ngescc</code>	$\triangleright$	<code>\rhd</code>
$\leq$	<code>\le</code>	$\not\leq$	<code>\ngesdot</code>	$\trianglelefteq$	<code>\unlhd</code>
$\triangleleft$	<code>\lescc</code>	$\not\leq$	<code>\ngesl</code>	$\trianglelefteq$	<code>\unrhd</code>

TABLE 143: boisik Inequalities

$\asymp$	<code>\eqslantgtr</code>	$\triangleright$	<code>\gtcir</code>	$\veeleftarrow$	<code>\lesseqgtr</code>	$\not\geq$	<code>\ngeq</code>
$\ll$	<code>\eqslantless</code>	$\approx\approx$	<code>\gtrapprox</code>	$\veeleftarrow$	<code>\lessgtr</code>	$\not\geq$	<code>\ngeqq</code>
$\approx\approx$	<code>\geqq</code>	$\approx\approx\approx\approx$	<code>\gtreqless</code>	$\approx$	<code>\lessim</code>	$\not\geq$	<code>\ngeqlant</code>
$\approx\approx$	<code>\geqlant</code>	$\approx\approx\approx\approx$	<code>\gtreqqless</code>	$\lll$	<code>\lll</code>	$\not\geq$	<code>\ngtr</code>
$\ggg$	<code>\ggg</code>	$\approx\approx$	<code>\ltrless</code>	$\approx\approx$	<code>\lnapprox</code>	$\not\geq$	<code>\nleq</code>
$\times$	<code>\glj</code>	$\approx\approx$	<code>\trsim</code>	$\approx\approx$	<code>\lneq</code>	$\not\geq$	<code>\nleqq</code>
$\approx\approx$	<code>\gnapprox</code>	$\approx\approx$	<code>\gvertneqq</code>	$\approx\approx$	<code>\lneqq</code>	$\not\geq$	<code>\nleqslant</code>
$\approx\approx$	<code>\gneq</code>	$\approx\approx$	<code>\leqq</code>	$\approx\approx$	<code>\lnsim</code>	$\not\geq$	<code>\nless</code>
$\not\approx\approx$	<code>\gneqq</code>	$\approx\approx$	<code>\leqslant</code>	$\approx\approx$	<code>\lt</code>		
$\approx\approx$	<code>\gnsim</code>	$\approx\approx$	<code>\lessapprox</code>	$\approx\approx$	<code>\ltcir</code>		
$\approx\approx$	<code>\Gt</code>	$\approx\approx$	<code>\lesseqgtr</code>	$\approx\approx$	<code>\lvertneqq</code>		

TABLE 144: stix Inequalities

$\asymp$	<code>\egsdot</code>	$\triangleright^?$	<code>\gtquest</code>	$\lessapprox$	<code>\lnsim</code>
$\ll$	<code>\elsdot</code>	$\approx\approx$	<code>\gtrapprox</code>	$\lessapprox$	<code>\lsime</code>
$\triangleright$	<code>\eqgtr</code>	$\approx\approx$	<code>\gtrarr</code>	$\lessapprox$	<code>\lsimg</code>
$\lessapprox$	<code>\eqless</code>	$\triangleright$	<code>\gtrdot</code>	$\lessapprox$	<code>\Lt</code>
$\approx\approx$	<code>\eqqgtr</code>	$\approx\approx$	<code>\gtreqless</code>	$\triangleleft$	<code>\ltcc</code>

(continued on next page)

(continued from previous page)

\eqqless	\gtreqqless	\ltcir
\eqqlantgtr	\gtrless	\ltlarr
\eqqlantless	\gtrsim	\ltquest
\eqslantgtr	\gvertneqq	\lvertneqq
\eqslantless	\lat	\neqslantgtr
\geq	\late	\neqslantless
\geqq	\leftarrowless	\ngeq
\geqslant	\leq	\ngeqq
\geqslant	\leqq	\ngeqslant
\gescc	\leqslant	\ngg
\gesdot	\leqslant	\ngtr
\gesdoto	\lescc	\ngtrless
\gesdotol	\lesdot	\ngtrsim
\gesles	\lesdoto	\nleq
\gg	\lesdotor	\nleqq
\ggg	\lesges	\nleqslant
\ggnest	\lessapprox	\nless
\gla	\lessdot	\nlessgtr
\gle	\lesseqgtr	\nlesssim
\glj	\lesseqgtr	\nll
\gnapprox	\lessgtr	\partial
\gneq	\lessim	\rightarrowgtr
\gneqq	\lgE	\simgE
\gnsim	\ll	\simgtr
\gsime	\lll	\simLE
\gsiml	\lllnest	\simless
\Gt	\lnapprox	\smt
\gtcc	\lneq	\smte
\gtcir	\lneqq	

`stix` defines `\le` as a synonym for `\leq`, `\ge` as a synonym for `\geq`, `\llless` as a synonym for `\lll`, `\gggtr` as a synonym for `\ggg`, `\nle` as a synonym for `\nleq`, and `\nge` as a synonym for `\ngeq`.

TABLE 145: logix Inequalities and Equalities

$\ominus$	<code>\CircEq</code>	$>$	<code>\Gr</code>	$\not\sim$	<code>\NotLs</code>	$>$	<code>\SbGr</code>
$\otimes$	<code>\CircGr</code>	$\geq$	<code>\Gre</code>	$\not\leq$	<code>\NotLse</code>	$\geq$	<code>\SbGre</code>
$\oslash$	<code>\CircGre</code>	$<$	<code>\Ls</code>	$\not>$	<code>\NotSbGr</code>	$<$	<code>\SbLs</code>
$\oslash$	<code>\CircLs</code>	$\leq$	<code>\Lse</code>	$\not\geq$	<code>\NotSbGre</code>	$\leq$	<code>\SbLse</code>
$\oslash$	<code>\CircLse</code>	$\neq$	<code>\NotEq</code>	$\not\sim$	<code>\NotSbLs</code>	$\approx$	<code>\Sm</code>
$\oslash$	<code>\CircSm</code>	$\not>$	<code>\NotGr</code>	$\not\leq$	<code>\NotSbLse</code>		
$=$	<code>\Eq</code>	$\not\geq$	<code>\NotGre</code>	$\not\sim$	<code>\NotSm</code>		

logix requires either  $\text{Lua}\text{\LaTeX}$  or  $\text{Xe}\text{\LaTeX}$ .

TABLE 146:  $\mathcal{AM}$  Triangle Relations

$\blacktriangleleft$	<code>\blacktriangleleft</code>	$\not\triangleright$	<code>\ntriangleright</code>	$\trianglerighteq$	<code>\trianglerighteq</code>
$\blacktriangleright$	<code>\blacktriangleright</code>	$\not\triangleleft$	<code>\ntriangleleft</code>	$\trianglelefteq$	<code>\trianglelefteq</code>
$\ntriangleleft$		$\triangleleft$	<code>\triangleleft</code>	$\vartriangleleft$	<code>\vartriangleleft</code>
$\ntrianglelefteq$		$\trianglelefteq$	<code>\trianglelefteq</code>	$\vartrianglelefteq$	<code>\vartrianglelefteq</code>

TABLE 147: stmaryrd Triangle Relations

$\trianglelefteqslant$	<code>\trianglelefteqslant</code>	$\trianglerighteqslant$	<code>\trianglerighteqslant</code>
$\ntrianglelefteqslant$	<code>\ntrianglelefteqslant</code>	$\not\trianglerighteqslant$	<code>\not\trianglerighteqslant</code>

TABLE 148: mathabx Triangle Relations

$\triangleleft$	<code>\ntriangleleft</code>	$\triangleleft$	<code>\triangleleft</code>	$\vartriangleleft$	<code>\vartriangleleft</code>
$\trianglelefteq$	<code>\trianglelefteq</code>	$\trianglelefteq$	<code>\trianglelefteq</code>	$\vartrianglelefteq$	<code>\vartrianglelefteq</code>
$\triangleleft$	<code>\ntriangleleft</code>	$\triangleleft$	<code>\triangleleft</code>	$\vartriangleleft$	<code>\vartriangleleft</code>
$\trianglelefteq$	<code>\ntrianglelefteq</code>	$\trianglelefteq$	<code>\trianglelefteq</code>	$\vartrianglelefteq$	<code>\vartrianglelefteq</code>

TABLE 149: MnSymbol Triangle Relations

▼	\filledmedtriangledown	△	\largetriangleup	▽	\smalltriangledown
◀	\filledmedtriangleleft	▽	\medtriangledown	◀	\smalltriangleleft
▶	\filledmedtriangleright	◀	\medtriangleleft	▶	\smalltriangleright
▲	\filledmedtriangleup	▷	\medtriangleright	▲	\smalltriangleup
▼	\filledtriangledown	△	\medtriangleup	△	\triangleeq
◀	\filledtriangleleft	#	\ntriangleeq	◀	\trianglelefteq
▶	\filledtriangleright	◊	\ntriangleleft	▶	\trianglerighteq
▲	\filledtriangleup	◊	\ntrianglelefteq	◀	\vartriangleleft
▽	\largetriangledown	▷	\ntriangleright	▷	\vartriangleright
◀	\largetriangleleft	▷	\ntrianglerighteq		
▶	\largetriangleright	▷	\ntrianglelefteq		

MnSymbol additionally defines synonyms for many of the preceding symbols: `\triangleeq` is a synonym for `\triangleeq`; `\lhd` and `\lessclosed` are synonyms for `\vartriangleleft`; `\rhd` and `\gtrclosed` are synonyms for `\vartriangleright`; `\unlhd` and `\leqclosed` are synonyms for `\trianglelefteq`; `\unrhd` and `\geqclosed` are synonyms for `\trianglerighteq`; `\blacktriangledown`, `\blacktriangleleft`, `\blacktriangleright`, and `\blacktriangle` [sic] are synonyms for, respectively, `\filledmedtriangledown`, `\filledmedtriangleleft`, `\filledmedtriangleright`, and `\filledmedtriangleup`; `\triangleright` is a synonym for `\medtriangleright`; `\triangle`, `\vartriangle`, and `\bigtriangleup` are synonyms for `\medtriangleup`; `\triangleleft` is a synonym for `\medtriangleleft`; `\triangledown` and `\bigtriangledown` are synonyms for `\medtriangledown`; `\lessclosed` is a synonym for `\ntriangleleft`; `\gtrclosed` is a synonym for `\ntriangleright`; `\geqclosed` is a synonym for `\ntrianglelefteq`; and `\geqclosed` is a synonym for `\ntrianglerighteq`.

The title “Triangle Relations” is a bit of a misnomer here as only `\triangleeq` and `\ntriangleeq` are defined as TeX relations (class 3 symbols). The `\largetriangle...` symbols are defined as TeX “ordinary” characters (class 0) and all of the remaining characters are defined as TeX binary operators (class 2).

TABLE 150: *fdsymbol* Triangle Relations

$\trianglelefteq$	<code>\geqclosed</code>	$\triangleright$	<code>\medtriangledown</code>	$\blacktriangleleft$	<code>\smallblacktriangleleft</code>
$\triangleright$	<code>\gtrclosed</code>	$\triangleleft$	<code>\medtriangleleft</code>	$\blacktriangleright$	<code>\smallblacktriangleright</code>
$\triangledown$	<code>\largetriangledown</code>	$\triangleright$	<code>\medtriangleright</code>	$\blacktriangleup$	<code>\smallblacktriangleup</code>
$\triangleup$	<code>\largetriangleup</code>	$\triangleleft$	<code>\medtriangleup</code>	$\blacktriangledown$	<code>\smalltriangledown</code>
$\trianglelefteq$	<code>\leqclosed</code>	$\neq$	<code>\ngeclosed</code>	$\triangleleft$	<code>\smalltriangleleft</code>
$\triangleleft$	<code>\lessclosed</code>	$\neq$	<code>\ngtrclosed</code>	$\triangleright$	<code>\smalltriangleright</code>
$\triangledown$	<code>\medblacktriangledown</code>	$\neq$	<code>\nleqclosed</code>	$\triangleup$	<code>\smalltriangleup</code>
$\blacktriangleleft$	<code>\medblacktriangleleft</code>	$\neq$	<code>\nlessclosed</code>	$\triangleq$	<code>\triangleeq</code>
$\blacktriangleright$	<code>\medblacktriangleright</code>	$\neq$	<code>\ntriangleeq</code>		
$\blacktriangleup$	<code>\medblacktriangleup</code>	$\triangledown$	<code>\smallblacktriangledown</code>		

*fdsymbol* defines synonyms for almost all of the preceding symbols:

$\triangledown$	<code>\bigtriangledown</code>	$\neq$	<code>\ntrianglelefteq</code>	$\triangleq$	<code>\triangleq</code>
$\triangleup$	<code>\bigtriangleup</code>	$\neq$	<code>\ntriangleright</code>	$\triangleright$	<code>\triangleright</code>
$\blacktriangle$	<code>\blacktriangle</code>	$\neq$	<code>\ntrianglerighteq</code>	$\trianglerighteq$	<code>\trianglerighteq</code>
$\blacktriangledown$	<code>\blacktriangledown</code>	$\triangle$	<code>\triangle</code>	$\vartriangle$	<code>\vartriangle</code>
$\blacktriangleleft$	<code>\blacktriangleleft</code>	$\triangledown$	<code>\triangledown</code>	$\vartriangleleft$	<code>\vartriangleleft</code>
$\blacktriangleright$	<code>\blacktriangleright</code>	$\triangleleft$	<code>\triangleleft</code>	$\vartriangleright$	<code>\vartriangleright</code>
$\ntriangleleft$	<code>\ntriangleleft</code>	$\triangleq$	<code>\trianglelefteq</code>		

The title “Triangle Relations” is a bit of a misnomer here as only `\triangleeq` and `\ntriangleeq` are defined as TeX relations (class 3 symbols). The `\largetriangle...` symbols are defined as TeX “ordinary” characters (class 0) and all of the remaining characters are defined as TeX binary operators (class 2).`

TABLE 151: *boisik* Triangle Relations

$\trianglelefteq$	<code>\ntriangleleft</code>	$\trianglelefteq$	<code>\trianglelefteq</code>	$\vartriangleleft$	<code>\vartriangleleft</code>
$\trianglelefteq$	<code>\ntrianglelefteq</code>	$\trianglelefteqslant$	<code>\trianglelefteqslant</code>	$\vartriangle$	<code>\vartriangle</code>
$\triangleright$	<code>\ntriangleright</code>	$\triangleright$	<code>\triangleright</code>	$\vartriangleleft$	<code>\vartriangleleft</code>
$\triangleright$	<code>\ntrianglerighteq</code>	$\trianglerighteq$	<code>\trianglerighteq</code>	$\vartriangleleft$	<code>\vartriangleleft</code>
$\triangleleft$	<code>\triangleleft</code>	$\triangleleft$	<code>\triangleleft</code>	$\vartriangleleft$	<code>\vartriangleleft</code>

TABLE 152: *stix* Triangle Relations

$\trianglelefteq$	<code>\lrtriangleeq</code>	$\neq$	<code>\nvartriangleright</code>	$\triangle$	<code>\vartriangle</code>
$\trianglelefteq$	<code>\ltrivb</code>	$\trianglelefteqslant$	<code>\trianglelefteqslant</code>	$\triangleleft$	<code>\vartriangleleft</code>
$\trianglelefteq$	<code>\ntrianglelefteq</code>	$\triangleleft$	<code>\triangleleft</code>	$\vartriangleleft$	<code>\vartriangleleft</code>
$\trianglelefteq$	<code>\ntrianglerighteq</code>	$\triangleleft$	<code>\triangleleft</code>	$\vartriangleleft$	<code>\vartriangleleft</code>
$\trianglelefteq$	<code>\nvartriangleleft</code>	$\triangleleft$	<code>\triangleleft</code>	$\vartriangleleft$	<code>\vartriangleleft</code>

TABLE 153: Arrows

$\Downarrow$	<code>\Downarrow</code>	$\longleftarrow$	<code>\longleftarrow</code>	$\nwarrow$	<code>\nwarrow</code>
$\downarrow$	<code>\downarrow</code>	$\Longleftarrow$	<code>\Longleftarrow</code>	$\Rightarrow$	<code>\Rightarrow</code>
$\hookleftarrow$	<code>\hookleftarrow</code>	$\longleftarrowtail$	<code>\longleftarrowtail</code>	$\rightarrow$	<code>\rightarrow</code>
$\hookrightarrow$	<code>\hookrightarrow</code>	$\Longleftarrowtail$	<code>\Longleftarrowtail</code>	$\searrow$	<code>\searrow</code>
$\leadsto$	<code>\leadsto</code> *	$\longmapsto$	<code>\longmapsto</code>	$\swarrow$	<code>\swarrow</code>
$\leftarrow$	<code>\leftarrow</code>	$\Longrightarrow$	<code>\Longrightarrow</code>	$\uparrow$	<code>\uparrow</code>
$\Leftarrow$	<code>\Leftarrow</code>	$\longrightarrow$	<code>\longrightarrow</code>	$\Uparrow$	<code>\Uparrow</code>
$\Leftrightarrow$	<code>\Leftrightarrow</code>	$\mapsto$	<code>\mapsto</code>	$\updownarrow$	<code>\updownarrow</code>
$\leftrightarrow$	<code>\leftrightarrow</code>	$\nearrow^{\dagger}$	<code>\nearrow^{\dagger}</code>	$\Updownarrow$	<code>\Updownarrow</code>

\* Not predefined by the L<sup>A</sup>T<sub>E</sub>X 2<sub>ε</sub> core. Use the `latexsym` package to expose this symbol.

† See the note beneath Table 270 for information about how to put a diagonal arrow across a mathematical expression (as in “ $\nabla \cdot \overset{0}{B}$ ”).

TABLE 154: Harpoons

$\leftharpoondown$	<code>\leftharpoondown</code>	$\rightharpoondown$	<code>\rightharpoondown</code>	$\rightleftharpoons$	<code>\rightleftharpoons</code>
$\leftharpoonup$	<code>\leftharpoonup</code>	$\rightharpoonup$	<code>\rightharpoonup</code>		

TABLE 155: `textcomp` Text-mode Arrows

$\textdownarrow$	<code>\textdownarrow</code>	$\textrightarrow$	<code>\textrightarrow</code>
$\textleftarrow$	<code>\textleftarrow</code>	$\textuparrow$	<code>\textuparrow</code>

TABLE 156: *AMS* Arrows

$\circlearrowleft$	<code>\circlearrowleft</code>	$\leftrightsquigarrow$	<code>\leftrightsquigarrow</code>	$\rightleftarrows$	<code>\rightleftarrows</code>
$\circlearrowright$	<code>\circlearrowright</code>	$\rightrightarrows$	<code>\rightrightarrows</code>	$\rightsquigarrow$	<code>\rightsquigarrow</code>
$\curvearrowleft$	<code>\curvearrowleft</code>	$\looparrowleft$	<code>\looparrowleft</code>	$\Rsh$	<code>\Rsh</code>
$\curvearrowright$	<code>\curvearrowright</code>	$\looparrowright$	<code>\looparrowright</code>	$\twoheadleftarrow$	<code>\twoheadleftarrow</code>
$\dashleftarrow$	<code>\dashleftarrow</code>	$\dashrightarrow$	<code>\dashrightarrow</code>	$\twoheadrightarrow$	<code>\twoheadrightarrow</code>
$\downdownarrows$	<code>\downdownarrows</code>	$\Lsh$	<code>\Lsh</code>	$\upuparrows$	<code>\upuparrows</code>
$\leftarrowtail$	<code>\leftarrowtail</code>	$\rightarrowtail$	<code>\rightarrowtail</code>		

TABLE 157: *AMS* Negated Arrows

$\nLeftarrow$	<code>\nLeftarrow</code>	$\nLeftrightarrow$	<code>\nLeftrightarrow</code>	$\nRightarrow$	<code>\nRightarrow</code>
$\nleftarrow$	<code>\nleftarrow</code>	$\nLeftrightarrow$	<code>\nLeftrightarrow</code>	$\nRightarrow$	<code>\nRightarrow</code>

TABLE 158:  $\mathcal{AM}$ S Harpoons

$\downarrow$	<code>\downharpoonleft</code>	$\Leftarrow$	<code>\leftrightharpoons</code>	$\uparrow$	<code>\upharpoonleft</code>
$\downarrow$	<code>\downharpoonright</code>	$\Leftarrow$	<code>\rightleftharpoons</code>	$\uparrow$	<code>\upharpoonright</code>

TABLE 159: stmaryrd Arrows

$\leftarrow$	<code>\leftarrowtriangle</code>	$\Leftarrow$	<code>\Mapsfrom</code>	$\leftarrow$	<code>\shortleftarrow</code>
$\Leftarrow$	<code>\leftrightharpoons</code>	$\Leftarrow$	<code>\mapsfrom</code>	$\rightarrow$	<code>\shortrightarrow</code>
$\Leftrightarrow$	<code>\rightleftharpoons</code>	$\Rightarrow$	<code>\Mapsto</code>	$\uparrow$	<code>\shortuparrow</code>
$\swarrow$	<code>\lightning</code>	$\nearrow$	<code>\nnearrow</code>	$\downarrow$	<code>\ssearrow</code>
$\Longleftarrow$	<code>\Longmapsfrom</code>	$\nwarrow$	<code>\nnwarrow</code>	$\downarrow$	<code>\sswarrow</code>
$\Longleftarrow$	<code>\longmapsfrom</code>	$\rightarrow$	<code>\rightarrowtriangle</code>		
$\Longrightarrow$	<code>\Longmapsto</code>	$\downarrow$	<code>\shortdownarrow</code>		

TABLE 160: txfonts/pfxfonts Arrows

$\squareleftarrow$	<code>\boxdotLeft</code>	$\circlearrowleft$	<code>\circleddotright</code>	$\squareleftarrow$	<code>\Diamondleft</code>
$\squareleftarrow$	<code>\boxdotleft</code>	$\circlearrowleft$	<code>\circleleft</code>	$\squareleftarrow$	<code>\Diamondright</code>
$\squarerightarrow$	<code>\boxdotright</code>	$\circlearrowright$	<code>\circleright</code>	$\squarerightarrow$	<code>\DiamondRight</code>
$\squarerightarrow$	<code>\boxdotRight</code>	$\leftrightarrow$	<code>\dashleftrightarrow</code>	$\rightsquigarrow$	<code>\leftsquigarrow</code>
$\squareleftarrow$	<code>\boxLeft</code>	$\Leftrightarrow$	<code>\DiamonddotLeft</code>	$\nearrow$	<code>\Nearrow</code>
$\squareleftarrow$	<code>\boxleft</code>	$\Leftrightarrow$	<code>\Diamonddotleft</code>	$\nwarrow$	<code>\Nwarrow</code>
$\squarerightarrow$	<code>\boxright</code>	$\diamondleftarrow$	<code>\Diamonddotright</code>	$\Rightarrow$	<code>\Rrightarrow</code>
$\squarerightarrow$	<code>\boxRight</code>	$\diamondrightarrow$	<code>\DiamonddotRight</code>	$\searrow$	<code>\Searrow</code>
$\circlearrowleft$	<code>\circleddotleft</code>	$\circlearrowleft$	<code>\DiamondLeft</code>	$\swarrow$	<code>\Swarrow</code>

TABLE 161: mathabx Arrows

$\circlearrowleft$	<code>\circlearrowleft</code>	$\leftarrow$	<code>\leftarrow</code>	$\nwarrow$	<code>\nwarrow</code>
$\circlearrowright$	<code>\circlearrowright</code>	$\Leftarrow$	<code>\leftleftarrows</code>	$\restriction$	<code>\restriction</code>
$\curvearrowbotleft$	<code>\curvearrowbotleft</code>	$\leftrightarrow$	<code>\leftrightarrow</code>	$\rightarrow$	<code>\rightarrow</code>
$\curvearrowbotright$	<code>\curvearrowbotright</code>	$\Leftarrow$	<code>\leftrightarrows</code>	$\leftleftarrows$	<code>\leftleftarrows</code>
$\curvearrowbotright$	<code>\curvearrowbotright</code>	$\rightsquigarrow$	<code>\leftrightsquigarrow</code>	$\rightrightarrows$	<code>\rightrightarrows</code>
$\curvearrowleft$	<code>\curvearrowleft</code>	$\rightsquigarrow$	<code>\leftsquigarrow</code>	$\rightsquigarrow$	<code>\rightsquigarrow</code>
$\curvearrowleftright$	<code>\curvearrowleftright</code>	$\curvearrowright$	<code>\lefttorightarrow</code>	$\righttoleftarrow$	<code>\righttoleftarrow</code>
$\curvearrowright$	<code>\curvearrowright</code>	$\looparrowleft$	<code>\looparrowdownleft</code>	$\Rsh$	<code>\Rsh</code>
$\dlsh$	<code>\dlsh</code>	$\looparrowright$	<code>\looparrowdownright</code>	$\searrow$	<code>\searrow</code>
$\downdownarrows$	<code>\downdownarrows</code>	$\looparrowleft$	<code>\looparrowleft</code>	$\swarrow$	<code>\swarrow</code>
$\downtouparrow$	<code>\downtouparrow</code>	$\looparrowright$	<code>\looparrowright</code>	$\updownarrows$	<code>\updownarrows</code>
$\downuparrows$	<code>\downuparrows</code>	$\Lsh$	<code>\Lsh</code>	$\uptodownarrow$	<code>\uptodownarrow</code>
$\drsh$	<code>\drsh</code>	$\nearrow$	<code>\nearrow</code>	$\upuparrows$	<code>\upuparrows</code>

TABLE 162: mathabx Negated Arrows

$\Leftarrow$	<code>\nLeftarrow</code>	$\Leftrightarrow$	<code>\nleftrightarrow</code>	$\rightarrow$	<code>\nrightarrow</code>
$\Leftarrow$	<code>\nleftarrow</code>	$\Leftrightarrow$	<code>\nleftrightarrow</code>	$\Rightarrow$	<code>\nRightarrow</code>

TABLE 163: mathabx Harpoons

$\Leftarrow$	<code>\barleftharpoon</code>	$\leftarrow$	<code>\leftharpoonup</code>	$\Leftarrow$	<code>\rightleftharpoons</code>
$\Rightarrow$	<code>\barrightharpoon</code>	$\Leftarrow$	<code>\leftleftharpoons</code>	$\Rightarrow$	<code>\rightrightharpoons</code>
$\Downarrow$	<code>\downdownharpoons</code>	$\hookleftarrow$	<code>\leftrightharpoon</code>	$\Downarrow$	<code>\updownharpoons</code>
$\downarrow$	<code>\downharpoonleft</code>	$\Leftarrow$	<code>\leftrightharpoons</code>	$\downarrow$	<code>\upharpoonleft</code>
$\downarrow$	<code>\downharpoonright</code>	$\Rightarrow$	<code>\rightbarharpoon</code>	$\downarrow$	<code>\upharpoonright</code>
$\Downarrow$	<code>\downupharpoons</code>	$\rightarrow$	<code>\rightharpoondown</code>	$\Downarrow$	<code>\upupharpoons</code>
$\Leftarrow$	<code>\leftbarharpoon</code>	$\rightarrow$	<code>\rightharpoonup</code>		
$\leftarrow$	<code>\leftharpoondown</code>	$\rightarrow$	<code>\rightleftharpoon</code>		

TABLE 164: MnSymbol Arrows

$\curvearrowdownup$	<code>\curvearrowdownup</code>	$\longleftarrow$	<code>\longleftarrow</code>	$\swarrow$	<code>\rhookswarrow</code>
$\curvearrowleftright$	<code>\curvearrowleftright</code>	$\iff$	<code>\Longleftrightarrow</code>	$\uparrow$	<code>\rhookuparrow</code>
$\curvearrownesw$	<code>\curvearrownesw</code>	$\iff$	<code>\Vlongleftrightarrow</code>	$\rightarrow$	<code>\rightarrow</code>
$\curvearrownwse$	<code>\curvearrownwse</code>	$\iff$	<code>\Vlongleftrightarrow</code>	$\Rightarrow$	<code>\Rightarrow</code>
$\curvearrowrightleft$	<code>\curvearrowrightleft</code>	$\mapsto$	<code>\Vlongmapsto</code>	$\rightarrowtail$	<code>\rightarrowtail</code>
$\curvearrowsenw$	<code>\curvearrowsenw</code>	$\rightarrow$	<code>\Vlongrightarrow</code>	$\rightleftarrows$	<code>\rightleftarrows</code>
$\curvearrowswne$	<code>\curvearrowswne</code>	$\Longrightarrow$	<code>\Vlongrightarrow</code>	$\rightsquigarrow$	<code>\rightsquigarrow</code>
$\curvearrowupdown$	<code>\curvearrowupdown</code>	$\wp$	<code>\looparrowleft</code>	$\rightmapsto$	<code>\rightmapsto</code>
$\dasheddownarrow$	<code>\dasheddownarrow</code>	$\wp$	<code>\looparrowright</code>	$\rightrightarrowtail$	<code>\rightrightarrowtail</code>
$\dashedleftarrow$	<code>\dashedleftarrow</code>	$\lsh$		$\rightarrows$	<code>\rightarrows</code>
$\dashednearrow$	<code>\dashednearrow</code>	$\nearrow$		$\rightrightrightarrows$	<code>\rightrightrightarrows</code>
$\dashednarrow$	<code>\dashednarrow</code>	$\nearrow$		$\rightrightrightarrows$	<code>\rightrightrightarrows</code>
$\dashedrightarrow$	<code>\dashedrightarrow</code>	$\nearrowtail$		$\Rsh$	<code>\Rsh</code>
$\dashedsearrow$	<code>\dashedsearrow</code>	$\nearrow$		$\searrow$	<code>\searrow</code>
$\dashedswarrow$	<code>\dashedswarrow</code>	$\nearrow$		$\Searrow$	<code>\Searrow</code>
$\dasheduparrow$	<code>\dasheduparrow</code>	$\nearrow$		$\searrowtail$	<code>\searrowtail</code>
$\Downarrow$	<code>\Downarrow</code>	$\nearrowtail$		$\Selsquigarrow$	<code>\Selsquigarrow</code>
$\downarrow$	<code>\downarrow</code>			$\semapsto$	<code>\semapsto</code>
$\downarrowtail$	<code>\downarrowtail</code>	$\nearrowtail$		$\senarrows$	<code>\senarrows</code>
$\Downarrow$	<code>\Downarrow</code>	$\nearrowtail$		$\sersquigarrow$	<code>\sersquigarrow</code>
$\downarrow\downarrows$	<code>\downarrow\downarrows</code>	$\nearrowtail$		$\sesearrows$	<code>\sesearrows</code>
$\Downarrow\Downarrow$	<code>\Downarrow\Downarrow</code>	$\nearrowtail$		$\squigarrowdownup$	<code>\squigarrowdownup</code>
$\Downarrow\Downarrow$	<code>\Downarrow\Downarrow</code>	$\nearrowtail$		$\squigarrowleftright$	<code>\squigarrowleftright</code>

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$\downarrow$	<code>\downrsquigarrow</code>	$\nwarrowtail$	<code>\squigarrownesw</code>
$\updownarrow$	<code>\downuparrows</code>	$\nwlssquigarrow$	<code>\squigarrowrownwse</code>
$\circlearrowleft$	<code>\lcirclearrowdown</code>	$\nwmapsto$	<code>\squigarrowrightleft</code>
$\circlearrowleft$	<code>\lcirclearrowleft</code>	$\nwnwarrows$	<code>\squigarrowsenw</code>
$\circlearrowright$	<code>\lcirclearrowright</code>	$\nwrssquigarrow$	<code>\squigarrowswne</code>
$\circlearrowup$	<code>\lcirclearrowup</code>	$\nwsearrow$	<code>\squigarrowupdown</code>
$\curvearrowleft$	<code>\lcurvearrowdown</code>	$\Nwsearrow$	<code>\swarrow</code>
$\curvearrowleft$	<code>\lcurvearrowleft</code>	$\nwsearrows$	<code>\Swarrow</code>
$\curvearrowleft$	<code>\lcurvearrowne</code>	$\partial\text{vardl}\text{circleleftint}^*$	<code>\swarrowtail</code>
$\curvearrowleft$	<code>\lcurvearrownw</code>	$\partial\text{vardl}\text{circlerightint}^*$	<code>\swlsquigarrow</code>
$\curvearrowright$	<code>\lcurvearrowright</code>	$\partial\text{vardr}\text{circleleftint}^*$	<code>\swmapsto</code>
$\curvearrowright$	<code>\lcurvearrowse</code>	$\partial\text{vardr}\text{circlerightint}^*$	<code>\swnearrows</code>
$\curvearrowright$	<code>\lcurvearrowsw</code>	$\partial\text{varl}\text{circleleftint}^*$	<code>\swrsquigarrow</code>
$\curvearrowup$	<code>\lcurvearrowup</code>	$\partial\text{varl}\text{circlerightint}^*$	<code>\swswarrows</code>
$\Leftarrow$	<code>\Leftarrow</code>	$\partial\text{vartr}\text{circleleftint}^*$	<code>\twoheaddownarrow</code>
$\leftarrow$	<code>\leftarrow</code>	$\partial\text{vartr}\text{circlerightint}^*$	<code>\twoheadleftarrow</code>
$\leftarrowtail$	<code>\leftarrowtail</code>	$\rcirclearrowdown$	<code>\twoheadnearrow</code>
$\leftleftarrows$	<code>\leftleftarrows</code>	$\rcirclearrowleft$	<code>\twoheadnarrow</code>
$\leftleftarrow$	<code>\leftleftarrow</code>	$\rcirclearrowright$	<code>\twoheadrightarrow</code>
$\leftmapsto$	<code>\leftmapsto</code>	$\rcirclearrowup$	<code>\twoheadsearrow</code>
$\leftrightarrow$	<code>\leftrightarrow</code>	$\rcurvearrowdown$	<code>\twoheadsarrow</code>
$\Leftrightarrow$	<code>\Leftrightarrow</code>	$\rcurvearrowleft$	<code>\twoheaduparrow</code>
$\leftrightarrows$	<code>\leftrightarrows</code>	$\rcurvearrowne$	<code>\uparrow</code>
$\leftrightsquigarrow$	<code>\leftrightsquigarrow</code>	$\rcurvearrownw$	<code>\Uparrow</code>
$\lhookdownarrow$	<code>\lhookdownarrow</code>	$\rcurvearrowright$	<code>\uparrowtail</code>
$\lhookleftarrow$	<code>\lhookleftarrow</code>	$\rcurvearrowse$	<code>\updownarrow</code>
$\lhooknearrow$	<code>\lhooknearrow</code>	$\rcurvearrowsw$	<code>\Updownarrow</code>
$\lhooknwarrow$	<code>\lhooknwarrow</code>	$\rcurvearrowup$	<code>\updownarrows</code>
$\lhookrightarrow$	<code>\lhookrightarrow</code>	$\rhookdownarrow$	<code>\uplsquigarrow</code>
$\lhooksearrow$	<code>\lhooksearrow</code>	$\rhookleftarrow$	<code>\upmapsto</code>
$\lhookswarrow$	<code>\lhookswarrow</code>	$\rhooknearrow$	<code>\uprsquigarrow</code>
$\lhookuparrow$	<code>\lhookuparrow</code>	$\rhooknwarrow$	<code>\upuparrows</code>
$\lightning$	<code>\lightning</code>	$\rhookrightarrow$	
$\Leftarrow$	<code>\Leftarrow</code>	$\rhooksearrow$	

MnSymbol additionally defines synonyms for some of the preceding symbols:

$\circlearrowleft$	<code>\circlearrowleft</code>	(same as <code>\rcirclearrowup</code> )
$\circlearrowright$	<code>\circlearrowright</code>	(same as <code>\lcirclearrowup</code> )
$\curvearrowleft$	<code>\curvearrowleft</code>	(same as <code>\rcurvearrowleft</code> )
$\curvearrowright$	<code>\curvearrowright</code>	(same as <code>\lcurvearrowright</code> )
$\dashleftarrow$	<code>\dashleftarrow</code>	(same as <code>\dashedleftarrow</code> )
$\dashrightarrow$	<code>\dashrightarrow</code>	(same as <code>\dashedrightarrow</code> )
$\hookleftarrow$	<code>\hookleftarrow</code>	(same as <code>\rhookleftarrow</code> )
$\hookrightarrow$	<code>\hookrightarrow</code>	(same as <code>\lhookrightarrow</code> )
$\leadsto$	<code>\leadsto</code>	(same as <code>\rightlsquigarrow</code> )
$\leftrightsquigarrow$	<code>\leftrightsquigarrow</code>	(same as <code>\squigarrowleftright</code> )
$\mapsto$	<code>\mapsto</code>	(same as <code>\rightmapsto</code> )
$\rightsquigarrow$	<code>\rightsquigarrow</code>	(same as <code>\rightlsquigarrow</code> )

\* The `\partialvar...int` macros are intended to be used internally by `MnSymbol` to produce various types of integrals.

TABLE 165: `MnSymbol` Negated Arrows

⤠	<code>\ncurvaturearrowdownup</code>	⤡	<code>\nlhooknwarrow</code>	⤢	<code>\nrightleftarrows</code>
⤣	<code>\ncurvaturearrowleftright</code>	⤤	<code>\nlhookrightarrow</code>	⤥	<code>\nrightlsquigarrow</code>
⤦	<code>\ncurvaturearrownesw</code>	⤧	<code>\nlhooksearrow</code>	⤩	<code>\nrightmapsto</code>
⤨	<code>\ncurvaturearrownwse</code>	⤩	<code>\nlhookswarrow</code>	⤪	<code>\nrightrightarrows</code>
⤪	<code>\ncurvaturearrowrightleft</code>	⤫	<code>\nlhookuparrow</code>	⤬	<code>\nrightrsquigarrow</code>
⤭	<code>\ncurvaturearrowsenw</code>	⤮	<code>\nLleftarrow</code>	⤯	<code>\nRightarrow</code>
⤮	<code>\ncurvaturearrowswne</code>	⤯	<code>\nnearrow</code>	⤰	<code>\nSearrow</code>
⤯	<code>\ncurvaturearrowupdown</code>	⤱	<code>\nNearrow</code>	⤱	<code>\nsearrow</code>
⤱	<code>\ndasheddownarrow</code>	⤲	<code>\nnearrowtail</code>	⤲	<code>\nsearrowtail</code>
⤳	<code>\ndashedleftarrow</code>	⤳	<code>\nnelsquigarrow</code>	⤳	<code>\nselsquigarrow</code>
⤴	<code>\ndashednearrow</code>	⤴	<code>\nnemapsto</code>	⤴	<code>\nsemapsto</code>
⤵	<code>\ndashednwarrown</code>	⤵	<code>\nnenearrows</code>	⤵	<code>\nsearrowarrows</code>
⤶	<code>\ndashedrightarrow</code>	⤶	<code>\nnersquigarrow</code>	⤶	<code>\nsersquigarrow</code>
⤷	<code>\ndashedsearrow</code>	⤷	<code>\nNesarrow</code>	⤷	<code>\nsesearrows</code>
⤸	<code>\ndashedswarrow</code>	⤸	<code>\nnesarrow</code>	⤸	<code>\nsquigarrowdownup</code>
⤹	<code>\ndasheduparrow</code>	⤹	<code>\nneswarrows</code>	⤹	<code>\nsquigarrowleftright</code>
⤺	<code>\downarrow</code>	⤺	<code>\nNwarrown</code>	⤺	<code>\nsquigarrownesw</code>
⤻	<code>\Downarrow</code>	⤻	<code>\nnarrow</code>	⤻	<code>\nsquigarrownwse</code>
⤼	<code>\downarrowtail</code>	⤼	<code>\nnarrowtail</code>	⤼	<code>\nsquigarrowrightleft</code>
⤽	<code>\downdownarrows</code>	⤽	<code>\nnwlsquigarrow</code>	⤽	<code>\nsquigarrowsenw</code>
⤾	<code>\downarrowlsquigarrow</code>	⤾	<code>\nnwmapsto</code>	⤾	<code>\nsquigarrowswne</code>
⤿	<code>\downarrowmapsto</code>	⤿	<code>\nnwnwarrows</code>	⤿	<code>\nsquigarrowupdown</code>
⤿	<code>\downarrowrsquigarrow</code>	⤿	<code>\nnwrsquigarrow</code>	⤿	<code>\nswarrow</code>
⤿	<code>\downuparrows</code>	⤿	<code>\nnwsearrow</code>	⤿	<code>\nSwarrow</code>
⤿	<code>\lrcleararrowdown</code>	⤿	<code>\nNsearrow</code>	⤿	<code>\nswarrowtail</code>
⤿	<code>\lrcleararrowleft</code>	⤿	<code>\nnwsearrows</code>	⤿	<code>\nswlsquigarrow</code>
⤿	<code>\lrcleararrowright</code>	⤿	<code>\nrcleararrowdown</code>	⤿	<code>\nswmapsto</code>
⤿	<code>\lrcleararrowup</code>	⤿	<code>\nrcleararrowleft</code>	⤿	<code>\nswnearrows</code>
⤿	<code>\lrcurvaturearrowdown</code>	⤿	<code>\nrcleararrowright</code>	⤿	<code>\nswrsquigarrow</code>
⤿	<code>\lrcurvaturearrowleft</code>	⤿	<code>\nrcleararrowup</code>	⤿	<code>\nswswarrows</code>
⤿	<code>\lrcurvaturearrowne</code>	⤿	<code>\nrcurvaturearrowdown</code>	⤿	<code>\ntwoheaddownarrow</code>
⤿	<code>\lrcurvaturearrownw</code>	⤿	<code>\nrcurvaturearrowleft</code>	⤿	<code>\ntwoheadleftarrow</code>
⤿	<code>\lrcurvaturearrowright</code>	⤿	<code>\nrcurvaturearrowne</code>	⤿	<code>\ntwoheadnearrow</code>
⤿	<code>\lrcurvaturearrowse</code>	⤿	<code>\nrcurvaturearrownw</code>	⤿	<code>\ntwoheadnarrow</code>
⤿	<code>\lrcurvaturearrowsw</code>	⤿	<code>\nrcurvaturearrowright</code>	⤿	<code>\ntwoheadrightarrow</code>
⤿	<code>\lrcurvaturearrowup</code>	⤿	<code>\nrcurvaturearrowse</code>	⤿	<code>\ntwoheadsearrow</code>
⤿	<code>\Leftarrow</code>	⤿	<code>\nrcurvaturearrowsw</code>	⤿	<code>\ntwoheadswarrow</code>
⤿	<code>\leftarrow</code>	⤿	<code>\nrcurvaturearrowup</code>	⤿	<code>\ntwoheaduparrow</code>

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$\Leftarrow$	<code>\nleftarrowtail</code>	$\not\Leftarrow$	<code>\nrhookdownarrow</code>	$\not\Leftarrow$	<code>\nuparrow</code>
$\nexists$	<code>\nleftleftarrows</code>	$\nexists\Leftarrow$	<code>\nrhookleftarrow</code>	$\nexists\Leftarrow$	<code>\nUparrow</code>
$\nexists$	<code>\nleftlsquigarrow</code>	$\nexists$	<code>\nrhooknearrow</code>	$\nexists$	<code>\nuparrowtail</code>
$\nLeftarrow$	<code>\leftarrowmapsto</code>	$\nLeftarrow$	<code>\nrhooknarrow</code>	$\nLeftarrow$	<code>\nupdownarrow</code>
$\nLeftarrow$	<code>\nleftrightarrow</code>	$\nLeftarrow$	<code>\nrhookrightarrow</code>	$\nLeftarrow$	<code>\nUpdownarrow</code>
$\nLeftarrow$	<code>\nLeftrightarrow</code>	$\nLeftarrow$	<code>\nrhooksearrow</code>	$\nLeftarrow$	<code>\nupdownarrows</code>
$\nexists$	<code>\nleftrightsarrows</code>	$\nexists$	<code>\nrhookswarrow</code>	$\nexists$	<code>\nuplsquigarrow</code>
$\nexists$	<code>\nleftrsquigarrow</code>	$\nexists$	<code>\nrhookuparrow</code>	$\nexists$	<code>\nupmapsto</code>
$\nexists$	<code>\nlhookdownarrow</code>	$\nexists$	<code>\nrightarrow</code>	$\nexists$	<code>\nuprsquigarrow</code>
$\nLeftarrow$	<code>\nlhookleftarrow</code>	$\nLeftarrow$	<code>\nrightarrow</code>	$\nLeftarrow$	<code>\nupuparrows</code>
$\nexists$	<code>\nlhooknearrow</code>	$\nexists$	<code>\nrightarrowtail</code>		

MnSymbol additionally defines synonyms for some of the preceding symbols:

$\circlearrowleft$	<code>\ncirclearrowleft</code>	(same as <code>\nrcirclearrowup</code> )
$\circlearrowright$	<code>\ncirclearrowright</code>	(same as <code>\nlcirclearrowup</code> )
$\curvearrowleft$	<code>\curvearrowleft</code>	(same as <code>\nrcurvearrowleft</code> )
$\curvearrowright$	<code>\curvearrowright</code>	(same as <code>\nlcurvearrowright</code> )
$\dasharrow$	<code>\ndasharrow</code>	(same as <code>\ndashedrightarrow</code> )
$\dashleftarrow$	<code>\dashleftarrow</code>	(same as <code>\dashedleftarrow</code> )
$\dashrightarrow$	<code>\dashrightarrow</code>	(same as <code>\dashedrightarrow</code> )
$\gets$	<code>\ngets</code>	(same as <code>\nleftarrow</code> )
$\hookleftarrow$	<code>\nhookleftarrow</code>	(same as <code>\nrhookleftarrow</code> )
$\hookrightarrow$	<code>\nhookrightarrow</code>	(same as <code>\nlhookrightarrow</code> )
$\leadsto$	<code>\leadsto</code>	(same as <code>\nrightsquigarrow</code> )
$\leftrightsquigarrow$	<code>\leftrightsquigarrow</code>	(same as <code>\nsquigarrowleftright</code> )
$\mapsto$	<code>\mapsto</code>	(same as <code>\nrightmapsto</code> )
$\rightsquigarrow$	<code>\rightsquigarrow</code>	(same as <code>\nrightlsquigarrow</code> )
$\rightarrowto$	<code>\rightarrowto</code>	(same as <code>\nrightarrow</code> )

TABLE 166: MnSymbol Harpoons

$\downarrow$	<code>\downharpoonccw*</code>	$\nearrow$	<code>\neswharpoons</code>	$\searrow$	<code>\seharpooncw</code>
$\downarrow$	<code>\downharpooncw*</code>	$\nearrow$	<code>\neswharpoonsenw</code>	$\nwarrow$	<code>\senwharpoons</code>
$\Downarrow$	<code>\downupharpoons</code>	$\nearrow$	<code>\nwharpoonccw</code>	$\nearrow$	<code>\swharpoonccw</code>
$\leftarrow$	<code>\leftharpoonccw*</code>	$\nwarrow$	<code>\nwharpooncw</code>	$\nearrow$	<code>\swharpooncw</code>
$\leftarrow$	<code>\leftharpooncw*</code>	$\nwarrow$	<code>\nwseharpoonnesw</code>	$\nearrow$	<code>\swneharpoons</code>
$\leftarrow$	<code>\leftrightharpoondownup</code>	$\nwarrow$	<code>\nwseharpoons</code>	$\downarrow$	<code>\updownharpoonleftright</code>
$\Leftarrow$	<code>\leftrightharpoons</code>	$\nwarrow$	<code>\nwseharpoonswne</code>	$\downarrow$	<code>\updownharpoonrightleft</code>
$\Leftarrow$	<code>\leftrightharpoonupdown</code>	$\rightarrow$	<code>\rightharpoonccw*</code>	$\nearrow$	<code>\updownharpoons</code>
$\nearrow$	<code>\neharpoonccw</code>	$\rightarrow$	<code>\rightharpooncw*</code>	$\downarrow$	<code>\upharpoonccw*</code>
$\nearrow$	<code>\neharpooncw</code>	$\Rightarrow$	<code>\rightleftharpoons</code>	$\downarrow$	<code>\upharpooncw*</code>
$\nearrow$	<code>\neswharpoonnwse</code>	$\nearrow$	<code>\seharpoonccw</code>		

\* Where marked, the “ccw” suffix can be replaced with “up” and the “cw” suffix can be replaced with “down”. (In addition, `\upharpooncw` can be written as `\restriction`.)

TABLE 167: MnSymbol Negated Harpoons

†	\ndownharpoonccw*	‡	\nneswharpoons	×	\nseharpooncw
†	\ndownharpooncw*	‡	\nneswharpoonsenw	※	\nsenwharpoons
#	\ndownupharpoons	‡	\nnwharpoonccw	✗	\nswharpoonccw
#	\nleftharpoonccw*	‡	\nnwharpooncw	✗	\nswharpooncw
#	\nleftharpooncw*	‡	\nnwseharpoonnesw	※	\nsnwneharpoons
#	\nleftrightharpoondownup	‡	\nnwseharpoons	†	\nupdownharpoonleftright
#	\nleftrightharpoons	‡	\nnwseharpoonsnwe	†	\nupdownharpoonrightleft
#	\nleftrightharpoonupdown	†	\nrightharpoonccw*	‡	\nupdownharpoons
×	\nneharpoonccw	†	\nrightharpooncw*	†	\nupharpoonccw*
×	\nneharpooncw	†	\nrightleftharpoons	†	\nupharpooncw*
×	\nneswharpoonnwse	‡	\nseharpoonccw		

\* Where marked, the “ccw” suffix can be replaced with “up” and the “cw” suffix can be replaced with “down”. (In addition, \nupharpooncw can be written as \nrestriction.)

TABLE 168: fdsymbol Arrows

○	\acwcirclearrowdown	←	\leftarrow	⇒	\rightrightarrowarrows
○	\acwcirclearrowleft	↖	\leftarrowtail	↗	\rightwavearrow
○	\acwcirclearrowright	↙	\leftbkarrow	↘	\Rrightarrow
○	\acwcirclearrowup	↖	\leftleftarrows	↗	\Rsh
↓	\acwlefttarcarrow	↔	\leftmapsto	↘	\searrow
↑	\acwnearcarrow	↔	\Leftmapsto	↖	\Searrow
↙	\acwnwarcarrow	↔	\Leftrightarrow	↘	\searrowtail
↖	\acwoverarcarrow	↔	\leftrightarrow	↘	\sebkarrow
⤒	\acwrightarcarrow	⤒	\leftrightarrows	⤓	\senarrows
⤑	\acwsearcarrow	⤑	\leftrightwavearrow	⤑	\sesearrows
⤒	\acwsvarcarrow	⤒	\leftwavearrow	⤒	\Swarrow
⤒	\acwunderarcarrow	⤒	\lightning	⤒	\swarrow
⤒	\bdlefttarcarrow	⤒	\Lleftarrow	⤒	\swallowtail
⤒	\bdnearcarrow	⤒	\Longleftarrow	⤒	\swbkarrow
⤒	\bdnwarcarrow	⤒	\longleftarrow	⤒	\swnearrows
⤒	\bdoverarcarrow	⤒	\longleftrightarrow	⤒	\swswallows
⤒	\bdrighttarcarrow	⤒	\Longleftrightarrow	⤒	\twoheaddownarrow
⤒	\bdsearcarrow	⤒	\longleftwavearrow	⤒	\twoheadleftarrow
⤒	\bdswarcarrow	⤒	\Longmapsfrom	⤒	\twoheadnearrow
⤒	\bdunderarcarrow	⤒	\longmapsfrom	⤒	\twoheadnarrow
○	\cwcirclearrowdown	⤒	\Longmapsto	⤒	\twoheadrightarrow
○	\cwcirclearrowleft	⤒	\longmapsto	⤒	\twoheadsearrow

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○	\cwcirclearrowright	→	\longrightarrow	↖	\twoheadswarrow
○	\cwcirclearrowup	⇒	\Longrightarrow	↑	\twoheaduparrow
↶	\cwleftarcarrow	~~⇒	\longrightwavearrow	↑	\uparrow
↷	\cwnearcarrow	↖	\looparrowleft	↑↑	\Uparrow
↷	\cwnwarcarrow	↗	\looparrowright	↑↑	\uparrowtail
↷	\cwoverarcarrow	↖	\Lsh	↑↑	\upbkarrow
↷	\cwrightarcarrow	↗	\nearrow	↓↑	\Updownarrow
↷	\cwsearcarrow	↗	\Narrow	↓↑	\updownarrow
↷	\cwsuararrow	↗	\nearrowtail	↓↑	\updownarrows
↷	\cwunderarcarrow	↗	\nebkarrow	↓↑	\updownwavearrow
⇓	\Ddownarrow	↗	\nenearrows	↑↓	\upmapsto
⇓	\Downarrow	↗	\Nesarrow	↑↓	\Upmapsto
⇓	\downarrow	↗	\nesarrow	↑↑↓	\upuparrows
⇓	\downarrowtail	↗	\nesarrows	↑↑↓	\upwavearrow
⇓	\downbkarrown	↗	\Narrow	↑↑↓	\Uparrow
⇓	\downdownarrows	↗	\narrow	↓↓	\vardownwavearrow
⇓	\Downmapsto	↗	\narrowtail	↓↓	\varhookdownarrow
⇓	\downmapsto	↖	\nwbkarrown	←↓	\varhookleftarrow
⇓	\downuparrows	↖	\nwnarrows	↗↓	\varhooknearrow
⇓	\downwavearrow	↖	\Nsearrow	↖↓	\varhooknarrow
⇓	\hookdownarrow	↖	\nwsearrow	→↓	\varhookrightarrow
↶	\hookleftarrow	↖	\nwsearrows	↘↓	\varhooksearrow
↷	\hooknearrow	↖	\Rdsh	↙↓	\varhookswarrow
↷	\hooknarrow	⇒	\Rightarrow	↑↓	\varhookuparrow
↷	\hookrightarrow	→	\rightarrow	↔↓	\varleftrightwavearrow
↷	\hooksearrow	→	\rightarrowtail	↔↓	\varleftwavearrow
↷	\hookswarrow	→	\rightbkarrown	↔↓	\varrightwavearrow
↑	\hookuparrow	↖	\rightleftarrows	↓↓	\varupdownwavearrow
↶	\Ldsh	⇒	\Rightmapsto	↑↓	\varupwavearrow
⇐	\Leftarrow	⇒	\rightmapsto	↑↓	\varupwavearrow

`fdsymbol` defines synonyms for most of the preceding symbols:

○	\acwgapcirclearrow	↝	\leftrightsquigarrow	↗	\rhooknarrow
○	\acwopencirclearrow	↝	\leftrsquigarrow	→	\rhookrightarrow
○	\circlearrowleft	↝	\leftsquigarrow	↘	\rhooksearrow
○	\circlearrowright	↗	\leftupcurvedarrow	↙	\rhookswarrow
↶	\curvearrowleft	↓	\lhookdownarrow	↑	\rhookuparrow
↷	\curvearrowright	↫	\lhookleftarrow	→	\rightcurvedarrow
○	\cwgapcirclearrow	↗	\lhooknearrow	↲	\rightdowncurvedarrow
○	\cwopencirclearrow	↗	\lhooknarrow	↠	\rightlcurvearrow
→	\dasharrow	↗	\lhookrightarrow	↤	\rightleftcurvearrow
←	\dashleftarrow	↘	\lhooksearrow	↥	\rightleftsquigarrow
→	\dashrightarrow	↘	\lhookswarrow	↦	\rightlsquigarrow
⤧	\downlcurvearrow	↑	\lhookuparrow	↤	\rightrcurvearrow
⤨	\downleftcurvedarrow	~~⇒	\longleadsto	↦	\rightrsquigarrow

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$\Downarrow$	<code>\downlslsquigarrow</code>	$\rightsquigarrow$	<code>\longleftsquigarrow</code>	$\rightsquigarrow$	<code>\rightsquigarrow</code>
$\Downarrow$	<code>\downrcurvearrow</code>	$\rightsquigarrow$	<code>\longrightsquigarrow</code>	$\rightsquigarrow$	<code>\rightupcurvedarrow</code>
$\Downarrow$	<code>\downrightcurvedarrow</code>	$\Downarrow$	<code>\mapsdown</code>	$\Downarrow$	<code>\selcurvearrow</code>
$\Downarrow$	<code>\downrsquigarrow</code>	$\Downarrow$	<code>\Mapsdown</code>	$\Downarrow$	<code>\senwcurvearrow</code>
$\Downarrow$	<code>\downupcurvearrow</code>	$\Leftarrow$	<code>\mapsfrom</code>	$\Leftarrow$	<code>\sercurvearrow</code>
$\Downarrow$	<code>\downupsquigarrow</code>	$\Leftarrow$	<code>\Mapsfrom</code>	$\Leftarrow$	<code>\swlcurvearrow</code>
$\Downarrow$	<code>\downzigzagarrow</code>	$\Rightarrow$	<code>\mapsto</code>	$\Rightarrow$	<code>\swnecurvearrow</code>
$\Leftarrow$	<code>\gets</code>	$\Rightarrow$	<code>\Mapsto</code>	$\Leftarrow$	<code>\swrcurvearrow</code>
$\nwarrow$	<code>\hkneararrow</code>	$\Uparrow$	<code>\mapsup</code>	$\rightarrow$	<code>\to</code>
$\nwarrow$	<code>\hknarrow</code>	$\Uparrow$	<code>\Mapsup</code>	$\Downarrow$	<code>\updowncurvearrow</code>
$\nwarrow$	<code>\hksearrow</code>	$\nearrow$	<code>\nelcurvearrow</code>	$\Downarrow$	<code>\updownsquigarrow</code>
$\nwarrow$	<code>\hksarrow</code>	$\nearrow$	<code>\nercurvearrow</code>	$\nearrow$	<code>\uplcurvearrow</code>
$\nwarrow$	<code>\leadsto</code>	$\nwarrow$	<code>\neswcurvearrow</code>	$\nwarrow$	<code>\upleftcurvedarrow</code>
$\nwarrow$	<code>\leftcurvedarrow</code>	$\nwarrow$	<code>\nwlcurvearrow</code>	$\nwarrow$	<code>\uplsquigarrow</code>
$\nwarrow$	<code>\leftdowncurvedarrow</code>	$\nwarrow$	<code>\nwrcurvearrow</code>	$\nwarrow$	<code>\uprcurvearrow</code>
$\nwarrow$	<code>\leftlcurvearrow</code>	$\nwarrow$	<code>\nwsecurvearrow</code>	$\nwarrow$	<code>\uprightcurvearrow</code>
$\nwarrow$	<code>\leftlsquigarrow</code>	$\downarrow$	<code>\rhookdownarrow</code>	$\nwarrow$	<code>\uprsquigarrow</code>
$\nwarrow$	<code>\leftrccurvearrow</code>	$\Leftarrow$	<code>\rhookleftarrow</code>	$\nwarrow$	
$\nwarrow$	<code>\leftrightcurvearrow</code>	$\nwarrow$	<code>\rhooknearrow</code>	$\nwarrow$	

TABLE 169: `fdsymbol` Negated Arrows

$\not\Downarrow$	<code>\nacwcirclearrowdown</code>	$\not\Leftarrow$	<code>\nleftarrow</code>	$\not\Rightarrow$	<code>\nRrightarrow</code>
$\not\Downarrow$	<code>\nacwcirclearrowleft</code>	$\not\Leftarrow$	<code>\nLeftarrow</code>	$\not\Leftarrow$	<code>\nsearrow</code>
$\not\Downarrow$	<code>\nacwcirclearrowright</code>	$\not\Leftarrow$	<code>\nleftarrowtail</code>	$\not\Leftarrow$	<code>\nSearrow</code>
$\not\Downarrow$	<code>\nacwcirclearrowup</code>	$\not\Leftarrow$	<code>\nleftbkarw</code>	$\not\Leftarrow$	<code>\nsearrowtail</code>
$\not\Leftarrow$	<code>\nacwleftarcarrow</code>	$\not\Leftarrow$	<code>\nleftleftarrows</code>	$\not\Leftarrow$	<code>\nsebkarrow</code>
$\not\Leftarrow$	<code>\nacwnearcarrow</code>	$\not\Leftarrow$	<code>\nleftmapsto</code>	$\not\Leftarrow$	<code>\nsenwarrows</code>
$\not\Leftarrow$	<code>\nacwnwarcarrow</code>	$\not\Leftarrow$	<code>\nLeftmapsto</code>	$\not\Leftarrow$	<code>\nsesearrows</code>
$\not\Leftarrow$	<code>\nacwoverarcarrow</code>	$\not\Leftarrow$	<code>\nleftrightarrow</code>	$\not\Leftarrow$	<code>\nswarrow</code>
$\not\Leftarrow$	<code>\nacwrightarcarrow</code>	$\not\Leftarrow$	<code>\nLeftrightarrow</code>	$\not\Leftarrow$	<code>\nSwarrow</code>
$\not\Leftarrow$	<code>\nacwsearcarrow</code>	$\not\Leftarrow$	<code>\nleftrightarrows</code>	$\not\Leftarrow$	<code>\nswarrowtail</code>
$\not\Leftarrow$	<code>\nacwswarcarrow</code>	$\not\Leftarrow$	<code>\nleftrightwavearrow</code>	$\not\Leftarrow$	<code>\nswbkarw</code>
$\not\Leftarrow$	<code>\nacwunderarcarrow</code>	$\not\Leftarrow$	<code>\nleftwavearrow</code>	$\not\Leftarrow$	<code>\nswnearrows</code>
$\not\Leftarrow$	<code>\nbleftarcarrow</code>	$\not\Leftarrow$	<code>\nLeftarrow</code>	$\not\Leftarrow$	<code>\nswswarrows</code>
$\not\Leftarrow$	<code>\nbdnearcarrow</code>	$\not\Leftarrow$	<code>\nlongleftarrow</code>	$\not\Leftarrow$	<code>\ntwoheaddownarrow</code>
$\not\Leftarrow$	<code>\nbdnwarccarw</code>	$\not\Leftarrow$	<code>\nLongleftarrow</code>	$\not\Leftarrow$	<code>\ntwoheadleftarrow</code>
$\not\Leftarrow$	<code>\nbdoeverarcarrow</code>	$\not\Leftarrow$	<code>\nlongleftrightarrow</code>	$\not\Leftarrow$	<code>\ntwoheadnearrow</code>
$\not\Leftarrow$	<code>\nbdrightarcarrow</code>	$\not\Leftarrow$	<code>\nLongleftrightarrow</code>	$\not\Leftarrow$	<code>\ntwoheadnarrow</code>

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$\nwarrow$	<code>\nbdseararrow</code>	$\swarrow\swarrow$	<code>\nlongleftwavearrow</code>	$\rightarrow\rightarrow$	<code>\ntwoheadrightarrowarrow</code>
$\nwarrow$	<code>\nbdswararrow</code>	$\leftrightarrow\leftrightarrow$	<code>\nlongmapsfrom</code>	$\nwarrow$	<code>\ntwoheadsearrow</code>
$\nwarrow$	<code>\nbdunderararrow</code>	$\not\equiv\equiv$	<code>\nLongmapsfrom</code>	$\nwarrow$	<code>\ntwoheadswarrow</code>
$\circlearrowleft$	<code>\ncwcirclearrowdown</code>	$\rightarrow\rightarrow$	<code>\nlongmapsto</code>	$\nwarrow$	<code>\ntwoheaduparrow</code>
$\circlearrowleft$	<code>\ncwcirclearrowleft</code>	$\not\equiv\equiv$	<code>\nLongmapsto</code>	$\nwarrow$	<code>\nuparrow</code>
$\circlearrowright$	<code>\ncwcirclearrowright</code>	$\rightarrow\rightarrow$	<code>\nlongrightarrowarrow</code>	$\nwarrow$	<code>\nUparrow</code>
$\circlearrowright$	<code>\ncwcirclearrowup</code>	$\not\equiv\equiv$	<code>\nLongrightarrowarrow</code>	$\nwarrow$	<code>\nuparrowtail</code>
$\nwarrow$	<code>\ncwlefttarcarrow</code>	$\sim\sim\swarrow\swarrow$	<code>\nlongrightwavearrow</code>	$\nwarrow$	<code>\nupbkarrow</code>
$\nwarrow$	<code>\ncwnearcarrow</code>	$\nwarrow$	<code>\nnearrow</code>	$\nwarrow$	<code>\nupdownarrow</code>
$\nwarrow$	<code>\ncwnwarcarrow</code>	$\not\nwarrow\nwarrow$	<code>\nNarrow</code>	$\nwarrow$	<code>\nUpdownarrow</code>
$\nwarrow$	<code>\ncwoverarcarrow</code>	$\nwarrow$	<code>\nnarrowtail</code>	$\nwarrow$	<code>\nUpdownarrows</code>
$\nwarrow$	<code>\ncwrightarcarrow</code>	$\nwarrow$	<code>\nnebkarrow</code>	$\nwarrow$	<code>\nupdownwavearrow</code>
$\nwarrow$	<code>\ncwsearcarrow</code>	$\not\nwarrow\nwarrow$	<code>\nnenarrows</code>	$\nwarrow$	<code>\nupmapsto</code>
$\nwarrow$	<code>\ncwswarcarrow</code>	$\not\nwarrow\nwarrow$	<code>\nnesarrow</code>	$\nwarrow$	<code>\nUpmapsto</code>
$\nwarrow$	<code>\ncwunderarcarrow</code>	$\not\nwarrow\nwarrow$	<code>\nNesarrow</code>	$\nwarrow$	<code>\nupuparrows</code>
$\nwarrow$	<code>\nDdownarrow</code>	$\not\nwarrow\nwarrow$	<code>\nnesarrows</code>	$\nwarrow$	<code>\nupwavearrow</code>
$\nwarrow$	<code>\ndownarrow</code>	$\nwarrow$	<code>\nnarrow</code>	$\nwarrow$	<code>\nUparrow</code>
$\nwarrow$	<code>\nDownarrow</code>	$\not\nwarrow\nwarrow$	<code>\nNarrow</code>	$\nwarrow$	<code>\nvardownwavearrow</code>
$\nwarrow$	<code>\ndownarrowtail</code>	$\not\nwarrow\nwarrow$	<code>\nnarrowtail</code>	$\nwarrow$	<code>\nvarhookdownarrow</code>
$\nwarrow$	<code>\ndownbkarrow</code>	$\not\nwarrow\nwarrow$	<code>\nnwbkarrow</code>	$\nwarrow$	<code>\nvarhookleftarrow</code>
$\nwarrow$	<code>\ndowndownarrows</code>	$\not\nwarrow\nwarrow$	<code>\nnwnarrows</code>	$\nwarrow$	<code>\nvarhooknearrow</code>
$\nwarrow$	<code>\ndownmapsto</code>	$\not\nwarrow\nwarrow$	<code>\nnwsearrow</code>	$\nwarrow$	<code>\nvarhooknarrow</code>
$\nwarrow$	<code>\nDownmapsto</code>	$\not\nwarrow\nwarrow$	<code>\nNsearrow</code>	$\nwarrow$	<code>\nvarhookrightarrow</code>
$\nwarrow$	<code>\ndownuparrows</code>	$\not\nwarrow\nwarrow$	<code>\nnwsearrows</code>	$\nwarrow$	<code>\nvarhooksearrow</code>
$\nwarrow$	<code>\ndownwavearrow</code>	$\rightarrow\rightarrow$	<code>\nrightarrowarrow</code>	$\nwarrow$	<code>\nvarhookswarrow</code>
$\nwarrow$	<code>\nhookdownarrow</code>	$\not\rightarrow\rightarrow$	<code>\nRightarrowarrow</code>	$\nwarrow$	<code>\nvarhookuparrow</code>
$\nwarrow$	<code>\nhookleftarrow</code>	$\not\rightarrow\rightarrow$	<code>\nrightarrowtail</code>	$\nwarrow$	<code>\nvarleftrightwavearrow</code>
$\nwarrow$	<code>\nhooknearrow</code>	$\rightarrow\rightarrow$	<code>\nrightbkarrow</code>	$\nwarrow$	<code>\nvarleftwavearrow</code>
$\nwarrow$	<code>\nhooknarrow</code>	$\not\rightarrow\rightarrow$	<code>\nrightleftarrows</code>	$\nwarrow$	<code>\nvarrightwavearrow</code>
$\nwarrow$	<code>\nhookrightarrow</code>	$\not\rightarrow\rightarrow$	<code>\nrightmapsto</code>	$\nwarrow$	<code>\nvarupdownwavearrow</code>
$\nwarrow$	<code>\nhooksearrow</code>	$\not\rightarrow\rightarrow$	<code>\nRightmapsto</code>	$\nwarrow$	<code>\nvarupwavearrow</code>
$\nwarrow$	<code>\nhookswarrow</code>	$\not\rightarrow\rightarrow$	<code>\nrightrightarrows</code>	$\nwarrow$	
$\nwarrow$	<code>\nhookuparrow</code>	$\not\rightarrow\rightarrow$	<code>\nrightwavearrow</code>	$\nwarrow$	

`fdsymbol` defines synonyms for most of the preceding symbols:

$\circlearrowleft$	<code>\nacwgapcirclearrow</code>	$\nwarrow$	<code>\leftarrow\downarrow\curvearrowleft</code>	$\rightarrow\rightarrow$	<code>\rightarrow\downarrow\curvearrowright</code>
$\circlearrowleft$	<code>\nacwopencirclearrow</code>	$\nwarrow$	<code>\leftarrow\downarrow\curvearrowleft</code>	$\nwarrow$	<code>\rightarrow\downarrow\curvearrowright</code>
$\circlearrowleft$	<code>\ncirclearrowleft</code>	$\nwarrow$	<code>\leftarrow\downarrow\curvearrowleft</code>	$\nwarrow$	<code>\rightarrow\downarrow\curvearrowright</code>
$\circlearrowright$	<code>\ncirclearrowright</code>	$\nwarrow$	<code>\leftarrow\downarrow\curvearrowleft</code>	$\nwarrow$	<code>\rightarrow\downarrow\curvearrowright</code>
$\nwarrow$	<code>\ncurarrowleft</code>	$\nwarrow$	<code>\leftarrow\downarrow\curvearrowleft</code>	$\nwarrow$	<code>\rightarrow\downarrow\curvearrowright</code>
$\nwarrow$	<code>\ncurarrowright</code>	$\nwarrow$	<code>\leftarrow\downarrow\curvearrowleft</code>	$\nwarrow$	<code>\rightarrow\downarrow\curvearrowright</code>
$\circlearrowleft$	<code>\ndasharrow</code>	$\nwarrow$	<code>\leftarrow\downarrow\curvearrowleft</code>	$\nwarrow$	<code>\rightarrow\downarrow\curvearrowright</code>
$\circlearrowleft$	<code>\nleftdowncurvedarrow</code>	$\nwarrow$	<code>\leftarrow\downarrow\curvearrowleft</code>	$\nwarrow$	<code>\rightarrow\downarrow\curvearrowright</code>
$\circlearrowleft$	<code>\nleftlcurvearrow</code>	$\nwarrow$	<code>\leftarrow\downarrow\curvearrowleft</code>	$\nwarrow$	<code>\rightarrow\downarrow\curvearrowright</code>
$\circlearrowleft$	<code>\nleftlsquigarrow</code>	$\nwarrow$	<code>\leftarrow\downarrow\curvearrowleft</code>	$\nwarrow$	<code>\rightarrow\downarrow\curvearrowright</code>
$\circlearrowleft$	<code>\nleftrcurvearrow</code>	$\nwarrow$	<code>\leftarrow\downarrow\curvearrowleft</code>	$\nwarrow$	<code>\rightarrow\downarrow\curvearrowright</code>
$\circlearrowleft$	<code>\nleftrightcurvearrow</code>	$\nwarrow$	<code>\leftarrow\downarrow\curvearrowleft</code>	$\nwarrow$	<code>\rightarrow\downarrow\curvearrowright</code>
$\circlearrowleft$	<code>\nleftrightsquigarrow</code>	$\nwarrow$	<code>\leftarrow\downarrow\curvearrowleft</code>	$\nwarrow$	<code>\rightarrow\downarrow\curvearrowright</code>
$\circlearrowleft$	<code>\nlefrtrcurvearrow</code>	$\nwarrow$	<code>\leftarrow\downarrow\curvearrowleft</code>	$\nwarrow$	<code>\rightarrow\downarrow\curvearrowright</code>
$\circlearrowleft$	<code>\nlefrtsquigarrow</code>	$\nwarrow$	<code>\leftarrow\downarrow\curvearrowleft</code>	$\nwarrow$	<code>\rightarrow\downarrow\curvearrowright</code>
$\circlearrowleft$	<code>\nleftsquigarrow</code>	$\nwarrow$	<code>\leftarrow\downarrow\curvearrowleft</code>	$\nwarrow$	<code>\rightarrow\downarrow\curvearrowright</code>
$\circlearrowleft$	<code>\nleftupcurvedarrow</code>	$\nwarrow$	<code>\leftarrow\downarrow\curvearrowleft</code>	$\nwarrow$	<code>\rightarrow\downarrow\curvearrowright</code>

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$\leftarrow\!\!\!/\;$	<code>\ndashleftarrow</code>	$\sim\!\!\!\sim\leftarrow$	<code>\nlongleadsto</code>	$\nearrow\!\!\!\nearrow$	<code>\nrightupcurvedarrow</code>
$\rightarrow\!\!\!/\;$	<code>\ndashrightarrow</code>	$\sim\!\!\!\sim\leftarrow\!\!\!\leftarrow$	<code>\nlongleftsquigarrow</code>	$\nwarrow\!\!\!\nwarrow$	<code>\nselcurvearrow</code>
$\downarrow\!\!\!\downarrow$	<code>\downnlcurvearrow</code>	$\sim\!\!\!\sim\leftarrow\!\!\!\leftarrow$	<code>\nlongrightsquigarrow</code>	$\nwarrow\!\!\!\nwarrow$	<code>\nsenwcurvearrow</code>
$\swarrow\!\!\!\swarrow$	<code>\downleftcurvedarrow</code>	$\nwarrow\!\!\!\nwarrow$	<code>\nmapsdown</code>	$\nwarrow\!\!\!\nwarrow$	<code>\nservcurvearrow</code>
$\searrow\!\!\!\searrow$	<code>\downlsquigarrow</code>	$\nwarrow\!\!\!\nwarrow$	<code>\nMapsdown</code>	$\nwarrow\!\!\!\nwarrow$	<code>\nswlcurvearrow</code>
$\nwarrow\!\!\!\nwarrow$	<code>\downrcurvearrow</code>	$\nwarrow\!\!\!\nwarrow$	<code>\nmapsfrom</code>	$\nwarrow\!\!\!\nwarrow$	<code>\nswnecurvearrow</code>
$\nwarrow\!\!\!\nwarrow$	<code>\downrightcurvedarrow</code>	$\nwarrow\!\!\!\nwarrow$	<code>\nMapsfrom</code>	$\nwarrow\!\!\!\nwarrow$	<code>\nswrcurvearrow</code>
$\nwarrow\!\!\!\nwarrow$	<code>\downrsquigarrow</code>	$\nwarrow\!\!\!\nwarrow$	<code>\nmapsto</code>	$\nwarrow\!\!\!\nwarrow$	<code>\nto</code>
$\nwarrow\!\!\!\nwarrow$	<code>\downupcurvearrow</code>	$\nwarrow\!\!\!\nwarrow$	<code>\nMapsto</code>	$\nwarrow\!\!\!\nwarrow$	<code>\updowncurvearrow</code>
$\nwarrow\!\!\!\nwarrow$	<code>\downupsquigarrow</code>	$\nwarrow\!\!\!\nwarrow$	<code>\nmapsup</code>	$\nwarrow\!\!\!\nwarrow$	<code>\updownsquigarrow</code>
$\nwarrow\!\!\!\nwarrow$	<code>\ngets</code>	$\nwarrow\!\!\!\nwarrow$	<code>\nMapsup</code>	$\nwarrow\!\!\!\nwarrow$	<code>\uplcurvearrow</code>
$\nwarrow\!\!\!\nwarrow$	<code>\nhknearrow</code>	$\nwarrow\!\!\!\nwarrow$	<code>\nnelcurvearrow</code>	$\nwarrow\!\!\!\nwarrow$	<code>\upleftcurvedarrow</code>
$\nwarrow\!\!\!\nwarrow$	<code>\nhknarrow</code>	$\nwarrow\!\!\!\nwarrow$	<code>\nnercurvearrow</code>	$\nwarrow\!\!\!\nwarrow$	<code>\uplsquigarrow</code>
$\nwarrow\!\!\!\nwarrow$	<code>\nhksearrow</code>	$\nwarrow\!\!\!\nwarrow$	<code>\nneswcurvearrow</code>	$\nwarrow\!\!\!\nwarrow$	<code>\uprcurvearrow</code>
$\nwarrow\!\!\!\nwarrow$	<code>\nhkswarrow</code>	$\nwarrow\!\!\!\nwarrow$	<code>\nnwlcurvearrow</code>	$\nwarrow\!\!\!\nwarrow$	<code>\uprightcurvearrow</code>
$\nwarrow\!\!\!\nwarrow$	<code>\nleadsto</code>	$\nwarrow\!\!\!\nwarrow$	<code>\nnwrcurvearrow</code>	$\nwarrow\!\!\!\nwarrow$	<code>\uprsquigarrow</code>
$\nwarrow\!\!\!\nwarrow$	<code>\nleftcurvedarrow</code>	$\nwarrow\!\!\!\nwarrow$	<code>\nnwsecurvearrow</code>		

TABLE 170: `fdsymbol` Harpoons

$\downarrow\!\!\!\downarrow$	<code>\downharpoonleft</code>	$\nearrow\!\!\!\nearrow$	<code>\neswharpoons</code>	$\nwarrow\!\!\!\nwarrow$	<code>\seharpoonsw</code>
$\downarrow\!\!\!\downarrow$	<code>\downharpoonright</code>	$\nearrow\!\!\!\nearrow$	<code>\neswharpoonsenw</code>	$\nwarrow\!\!\!\nwarrow$	<code>\senwharpoons</code>
$\downarrow\!\!\!\downarrow$	<code>\downupharpoons</code>	$\nwarrow\!\!\!\nwarrow$	<code>\nwharpoonne</code>	$\nearrow\!\!\!\nearrow$	<code>\swharpoonnw</code>
$\leftarrow\!\!\!\leftarrow$	<code>\leftharpoondown</code>	$\nwarrow\!\!\!\nwarrow$	<code>\nwharpoonsw</code>	$\nearrow\!\!\!\nearrow$	<code>\swharpoonse</code>
$\leftarrow\!\!\!\leftarrow$	<code>\leftharpoonup</code>	$\nwarrow\!\!\!\nwarrow$	<code>\nwseharpoonnesw</code>	$\nwarrow\!\!\!\nwarrow$	<code>\swneharpoons</code>
$\leftarrow\!\!\!\leftarrow$	<code>\leftrightharpoondownup</code>	$\nwarrow\!\!\!\nwarrow$	<code>\nwseharpoons</code>	$\downarrow\!\!\!\downarrow$	<code>\updownharpoonleftright</code>
$\leftarrow\!\!\!\leftarrow$	<code>\leftrightharpoons</code>	$\nwarrow\!\!\!\nwarrow$	<code>\nwseharpoonswne</code>	$\downarrow\!\!\!\downarrow$	<code>\updownharpoonrightleft</code>
$\leftarrow\!\!\!\leftarrow$	<code>\leftrightharpoonupdown</code>	$\rightarrow\!\!\!\rightarrow$	<code>\rightharpoondown</code>	$\downarrow\!\!\!\downarrow$	<code>\updownharpoons</code>
$\nearrow\!\!\!\nearrow$	<code>\neharpoonnw</code>	$\rightarrow\!\!\!\rightarrow$	<code>\rightharpoonup</code>	$\uparrow\!\!\!\uparrow$	<code>\upharpoonleft</code>
$\nearrow\!\!\!\nearrow$	<code>\neharpoonse</code>	$\rightarrow\!\!\!\rightarrow$	<code>\rightleftharpoons</code>	$\uparrow\!\!\!\uparrow$	<code>\upharpoonright</code>
$\nearrow\!\!\!\nearrow$	<code>\neswharpoonnwse</code>	$\rightarrow\!\!\!\rightarrow$	<code>\seharpoonne</code>		

`fdsymbol` defines `\restriction` as a synonym for `\upharpoonright`, `\updownharpoonsleftright` as a synonym for `\updownharpoons`, and `\downupharpoonsleftright` as a synonym for `\downupharpoons`.

TABLE 171: *fdsymbol* Negated Harpoons

†	\ndownharpoonleft	‡	\nneswharpoons	✗	\nseharpoonsw
†	\ndownharpoonright	✗	\nneswharpoonsew	✗	\nsenwharpoons
#	\ndownupharpoons	✗	\nnwharpoonne	✗	\nswharpoonnw
+	\nleftharpoondown	✗	\nnwharpoonsw	✗	\nswharpoonse
+	\nleftharpoonup	✗	\nnwseharpoonnesw	✗	\nswneharpoons
+	\nlefrightharpoondownup	✗	\nnwseharpoons	†	\nupdownharpoonleftright
#	\nlefrightharpoons	✗	\nnwseharpoonswne	†	\nupdownharpoonrightleft
+	\nlefrightharpoonupdown	†	\nrightharpoondown	#	\nupdownharpoons
✗	\nneharpoonnw	†	\nrightharpoonup	†	\nupharpoonleft
✗	\nneharpoonse	‡	\nrightleftharpoons	†	\nupharpoonright
✗	\nneswharpoonnwse	✗	\nseharpoonne		

*fdsymbol* defines \nrestriction as a synonym for \nupharpoonright, \ndownupharpoonsleftright as a synonym for \ndownupharpoons, and \nupdownharpoonsleftright as a synonym for \nupdownharpoons.

TABLE 172: *boisik* Arrows

←	\barleftarrow	↑	\Lsh
↖	\barleftarrowrightarrowbar	↓	\mapsdown
↖	\barovernorthwestarrow	⇐	\Mapsfrom
↶	\carriagereturn	⇒	\mapsfrom
↺	\circlearrowleft	⇒	\Mapsto
↻	\circlearrowright	⇒	\mapsto
↶	\cupleftarrow	↑	\mapsup
⤸	\curlyveedownarrow	↗	\Nearrow
⤷	\curlyveeuparrow	↘	\nearrowcorner
⤸	\curlywedgedownarrow	↗	\nnearrow
⤸	\curlywedgeuparrow	↖	\nnarrow
⤸	\curvearrowbotleft	⤸	\Narrow
⤸	\curvearrowbotleftright	⤸	\narrowcorner
⤸	\curvearrowbotright	⤸	\rightarrowbar
⤸	\curvearrowleft	⤸	\rightarrowcircle
⤸	\curvearrowleftright	⤸	\rightarrowtail
⤸	\curvearrowright	⤸	\rightarrowTriangle
⤸	\dlsh	⤸	\rightarrowtriangle
⤸	\downblackarrow	⤸	\rightblackarrow
⤸	\downdasharrow	⤸	\rightdasharrow
⤸	\downdownarrows	⤸	\rightleftarrows
⤸	\downtouparrow	⤸	\rightrightarrows
⤸	\downwhitearrow	⤸	\rightsquigarrow

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$\downarrow$	<code>\downzigzagarrow</code>	$\rightleftharpoons$	<code>\rightthreearrows</code>
$\downarrow$	<code>\drsh</code>	$\rightleftharpoons$	<code>\righttoleftarrow</code>
$\rightleftharpoons$	<code>\eqleftrightarrow</code>	$\Rightarrow$	<code>\rightwhitearrow</code>
$\leftarrow$	<code>\hookleftarrow</code>	$\Rightarrow$	<code>\rightwhiteroundarrow</code>
$\hookrightarrow$	<code>\hookrightarrow</code>	$\Rightarrow$	<code>\Rrightarrow</code>
$\leftleftarrows$	<code>\leftarrowtail</code>	$\Rsh$	<code>\Rsh</code>
$\leftarrow$	<code>\leftarrowTriangle</code>	$\S\!\!\!/\!\!\!/$	<code>\Searrow</code>
$\leftarrow$	<code>\leftarrowtriangle</code>	$\backslash\backslash$	<code>\sssearrow</code>
$\leftarrow$	<code>\leftblackarrow</code>	$\backslash\backslash$	<code>\ssswarrow</code>
$\leftarrow$	<code>\leftdasharrow</code>	$\S\!\!\!/\!\!\!/$	<code>\Swarrow</code>
$\leftleftarrows$	<code>\leftleftarrows</code>	$\Downarrow$	<code>\twoheaddownarrow</code>
$\Leftarrow$	<code>\leftrightarroweq</code>	$\Leftarrow$	<code>\twoheadleftarrow</code>
$\Leftarrow$	<code>\leftrightarrows</code>	$\Rightarrow$	<code>\twoheadrightarrow</code>
$\leftrightarrow$	<code>\leftrightarrowTriangle</code>	$\Uparrow$	<code>\twoheaduparrow</code>
$\leftrightarrow$	<code>\leftrightarrowtriangle</code>	$\Uparrow$	<code>\twoheadwhiteuparrow</code>
$\leftrightarrow$	<code>\leftrightblackarrow</code>	$\Uparrow$	<code>\twoheadwhiteuparrowpedestal</code>
$\rightsquigarrow$	<code>\leftrightsquigarrow</code>	$\Uparrow$	<code>\upblackarrow</code>
$\rightsquigarrow$	<code>\leftsquigarrow</code>	$\Uparrow$	<code>\updasharrow</code>
$\leftarrow$	<code>\lefttorightarrow</code>	$\Updownarrow$	<code>\updownarrowbar</code>
$\leftarrow$	<code>\leftwhitearrow</code>	$\Updownarrow$	<code>\updownblackarrow</code>
$\leftarrow$	<code>\leftwhiteroundarrow</code>	$\Updownarrow$	<code>\updownwhitearrow</code>
$\leftarrow$	<code>\leftzigzagarrow</code>	$\circlearrowleft$	<code>\uptodownarrow</code>
$\downarrow$	<code>\linefeed</code>	$\upuparrows$	<code>\upuparrows</code>
$\Leftarrow$	<code>\Lleftarrow</code>	$\uparrow$	<code>\upwhitearrow</code>
$\looparrowleft$	<code>\looparrowdownleft</code>	$\circlearrowup$	<code>\whitearrowupfrombar</code>
$\looparrowright$	<code>\looparrowdownright</code>	$\circlearrowup$	<code>\whitearrowuppedestal</code>
$\looparrowleft$	<code>\looparrowleft</code>	$\circlearrowup$	<code>\whitearrowuppedestalhbar</code>
$\looparrowright$	<code>\looparrowright</code>	$\circlearrowup$	<code>\whitearrowuppedestalvbar</code>

Many of these symbols are defined only if the `arrows` package option is specified.

TABLE 173: `boisik` Negated Arrows

$\nexists$	<code>\nHdownarrow</code>	$\nleftrightarrow$	<code>\nLeftrightarrow</code>	$\nRightarrow$	<code>\nRightarrow</code>
$\nexists$	<code>\nHuparrow</code>	$\nleftrightarrow$	<code>\nleftrightarrow</code>	$\nleftrightarrow$	<code>\nVleftarrow</code>
$\nleftrightarrow$	<code>\nLeftarrow</code>	$\nleftrightarrow$	<code>\nLeftrightarrow</code>	$\nRightarrow$	<code>\nVrightarrow</code>
$\nleftrightarrow$	<code>\nleftarrow</code>	$\nRightarrow$	<code>\nrightarrow</code>		

Many of these symbols are defined only if the `arrows` package option is specified.

TABLE 174: boisik Harpoons

$\downarrow$	<code>\downharpoonleft</code>	$\Leftarrow$	<code>\leftrightharpoons</code>	$\uparrow$	<code>\upharpoonleft</code>
$\downarrow$	<code>\downharpoonright</code>	$\rightarrow$	<code>\rightharpoondown</code>	$\uparrow$	<code>\upharpoonright</code>
$\leftarrow$	<code>\leftharpoondown</code>	$\rightarrow$	<code>\rightharpoonup</code>		
$\leftarrow$	<code>\leftharpoonup</code>	$\Rightarrow$	<code>\rightleftharpoons</code>		

TABLE 175: stix Arrows

$\circlearrowleft$	<code>\acwcirclearrow</code>	$\longrightarrow$	<code>\longmapsto</code>
$\circlearrowright$	<code>\acwgapcirclearrow</code>	$\Longrightarrow$	<code>\Longmapsto</code>
$\curvearrowleft$	<code>\acwleftarcarrow</code>	$\longrightarrow$	<code>\longrightarrow</code>
$\curvearrowright$	<code>\acwoverarcarrow</code>	$\Longrightarrow$	<code>\Longrightarrow</code>
$\curvearrowunder$	<code>\acwunderarcarrow</code>	$\rightsquigarrow$	<code>\longrightsquigarrow</code>
$\bar{\leftarrow}$	<code>\barleftarrow</code>	$\looparrowleft$	<code>\looparrowleft</code>
$\bar{\rightarrow}$	<code>\barleftarrow\rightarrowbar</code> *	$\looparrowright$	<code>\looparrowright</code>
$\bar{\leftrightarrow}$	<code>\barleftrightarrowdiamond</code>	$\Lsh$	<code>\Lsh</code>
$\bar{\uparrow}$	<code>\baruparrow</code>	$\mapsdown$	<code>\mapsdown</code>
$\bar{\leftarrow}$	<code>\bsimilarslantleftarrow</code>	$\Mapsfrom$	<code>\Mapsfrom</code>
$\bar{\rightarrow}$	<code>\bsimilarslantrightarrow</code>	$\Mapsfrom$	<code>\Mapsfrom</code>
$\bar{\downarrow}$	<code>\carriagereturn</code> *	$\mapsto$	<code>\mapsto</code>
$\bar{\curvearrowunder}$	<code>\ccwundercurvearrow</code>	$\Mapsto$	<code>\Mapsto</code>
$\bar{\circlearrowleft}$	<code>\circlearrowleft</code>	$\mapsup$	<code>\mapsup</code>
$\bar{\circlearrowright}$	<code>\circlearrowright</code>	$\nearrow$	<code>\nearrow</code>
$\bar{\leftarrow}$	<code>\circleonleftarrow</code>	$\nearrow$	<code>\nearrow</code>
$\bar{\rightarrow}$	<code>\circleonrightarrow</code>	$\neovnarrow$ *	<code>\neovnarrow</code> *
$\bar{\curvearrowleft}$	<code>\curvearrowleft</code>	$\neovsearrow$ *	<code>\neovsearrow</code> *
$\bar{\curvearrowleftplus}$	<code>\curvearrowleftplus</code>	$\nesarrow$	<code>\nesarrow</code>
$\bar{\curvearrowright}$	<code>\curvearrowright</code>	$\nwarrow$	<code>\nwarrow</code>
$\bar{\curvearrowrightminus}$	<code>\curvearrowrightminus</code>	$\Narrow$	<code>\Narrow</code>
$\bar{\circlearrowright}$	<code>\cwcirclearrow</code>	$\nwvnarrow$ *	<code>\nwvnarrow</code> *
$\bar{\circlearrowright}$	<code>\cwgapcirclearrow</code>	$\nwsearrow$	<code>\nwsearrow</code>
$\bar{\curvearrowright}$	<code>\cwrightarcarrow</code>	$\rdiagovsearrow$ *	<code>\rdiagovsearrow</code> *
$\bar{\curvearrowunder}$	<code>\cwundercurvearrow</code>	$\Rdsh$	<code>\Rdsh</code>
$\bar{\rightarrow}$	<code>\dbkarow</code>	$\Rightarrow$	<code>\Rightarrow</code>
$\bar{\Downarrow}$	<code>\DDownarrow</code>	$\rightarrow$	<code>\rightarrow</code>
$\bar{\Downarrow}$	<code>\Ddownarrow</code>	$\approx$	<code>\approx</code>
$\bar{\leftarrow}$	<code>\diamondonleftarrow</code>	$\rightarrowbackapprox$	<code>\rightarrowbackapprox</code>
$\bar{\leftrightarrow}$	<code>\diamondonleftarrowbar</code>	$\rightarrowbar$	<code>\rightarrowbar</code>
$\bar{\downarrow}$	<code>\downarrow</code>	$\rightarrowbsimil$	<code>\rightarrowbsimil</code>
$\bar{\Downarrow}$	<code>\Downarrow</code>	$\rightarrowdiamond$	<code>\rightarrowdiamond</code>
$\bar{\downarrow}$	<code>\downarrowbar</code>	$\oplus$	<code>\oplus</code>

*(continued on next page)*

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↓	\downarrowbarred	↗	\rightarrowplus
↓↓	\downdasharrow*	↖	\rightarrowshortleftarrow
⇓	\downdownarrows	⤒	\rightarrowsimilar
⤓	\downrightcurvedarrow*	⤔	\rightarrowtail
⤑	\downuparrows	⤖	\rightarrowtriangle
⤒	\downwhitearrow*	⤗	\rightarrowx
⤓	\downzigzagarrow	⤘	\rightbkarow
⤔	\draftingarrow*	⤙	\rightcurvedarrow
⤕⤕	\drbkarow	⤚	\rightdasharrow*
⤔⤔	\equalleftarrow	⤛	\rightdotarrow
⤔⤔	\equalrightarrow	⤜	\rightdowncurvedarrow
⤔⤔	\fdiagovnearrow*	⤖⤖	\rightleftarrows
⤔⤔	\hknearrow	⤖⤖⤖	\rightrightarrows
⤔⤔	\hknarrow	⤖⤖⤖⤖	\rightsquigarrow
⤔⤔	\hksearrow	⤖⤖⤖⤖⤖	\rightthreearrows
⤔⤔	\hkswarrow	⤖⤖⤖⤖⤖⤖	\rightwavearrow
⤔⤔	\hookleftarrow	⤖⤖⤖⤖⤖⤖⤖	\rightwhitearrow*
⤔⤔	\hookrightarrow	⤖⤖⤖⤖⤖⤖⤖⤖	\RRightarrow
⤔⤔	\Ldsh	⤖⤖⤖⤖⤖⤖⤖⤖⤖	\Rrightarrow
⤔⤔	\leftarrow	⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖	\Rsh
⤔⤔	\Leftarrow	⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖	\searrow
⤔⤔	\leftarrowapprox	⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖	\Searrow
⤔⤔	\leftarrowbackapprox	⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖	\seovnearrow*
⤔⤔	\leftarrowbsimilar	⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖	\shortrightarrowleftarrow
⤔⤔	\leftarrowonoplus	⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖	\similarleftarrow
⤔⤔	\leftarrowplus	⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖	\similarrightarrow
⤔⤔	\leftarrowshortrightarrow	⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖	\swarrow
⤔⤔	\leftarrowssimilar	⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖	\Swarrow
⤔⤔	\leftarrowtail	⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖	\toea
⤔⤔	\leftarrowtriangle	⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖	\tona
⤔⤔	\leftarrowx	⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖	\tosa
⤔⤔	\leftbkarrow	⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖	\towa
⤔⤔	\leftcurvedarrow	⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖	\twoheaddownarrow
⤔⤔	\leftdasharrow*	⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖	\twoheadleftarrow
⤔⤔	\leftdbkarow	⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖	\twoheadleftarrowtail
⤔⤔	\leftdotarrow	⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖	\twoheadleftdbkarow
⤔⤔	\leftdowncurvedarrow	⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖	\twoheadmapsfrom
⤔⤔	\leftleftarrows	⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖	\twoheadmapsto
⤔⤔	\Leftrightarrow	⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖	\twoheadrightarrow
⤔⤔	\leftrightarrow	⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖	\twoheadrightarrowtail
⤔⤔	\leftrightarrowcircle	⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖	\twoheaduparrow
⤔⤔	\leftrightarrows	⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖	\twoheaduparrowcircle
⤔⤔	\leftrightarrowtriangle	⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖	\uparrow
⤔⤔	\leftrightsquigarrow	⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖	\Uparrow
⤔⤔	\leftsquigarrow	⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖	\uparrowbarred
⤔⤔	\leftthreearrows	⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖⤖	\updasharrow*

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$\leftarrow$	<code>\leftwavearrow</code>	$\Downarrow$	<code>\Updownarrow</code>
$\Leftarrow$	<code>\leftwhitearrow^*</code>	$\Updownarrow$	<code>\updownarrow</code>
$\Downarrow$	<code>\linefeed^*</code>	$\Updownarrow$	<code>\updownarrowbar^*</code>
$\Lleftarrow$	<code>\LLeftarrow</code>	$\Updownarrow$	<code>\updownarrows</code>
$\Lleftarrow$	<code>\LLeftarrow</code>	$\Uparrow$	<code>\uprightcurvearrow^*</code>
$\longleftarrow$	<code>\longleftarrow</code>	$\Upuparrows$	<code>\upuparrows</code>
$\Longleftarrow$	<code>\Longleftarrow</code>	$\Upuparrow$	<code>\upwhitearrow^*</code>
$\Longleftrightarrow$	<code>\Longleftrightarrow</code>	$\UUparrow$	<code>\UUparrow</code>
$\longleftrightarrow$	<code>\longleftrightarrow</code>	$\Uparrow$	<code>\Uparrow</code>
$\longleftsquigarrow$	<code>\longleftsquigarrow</code>	$\Downarrow$	<code>\varcarriagereturn^*</code>
$\Longmapsfrom$	<code>\Longmapsfrom</code>	$\Updownarrow$	<code>\whitearrowupfrombar^*</code>
$\longmapsfrom$	<code>\longmapsfrom</code>		

\* Defined as an ordinary character, not as a binary relation.

stix defines `\acwopencirclearrow` as a synonym for `\circlearrowleft`, `\cwopencirclearrow` as a synonym for `\circlearrowright`, `\leadsto` as a synonym for `\rightsquigarrow`, `\dashleftarrow` as a synonym for `\leftdbkarow`, and `\dashrightarrow` and `\dasharrow` as synonyms for `\dbkarow`.

TABLE 176: stix Negated Arrows

$\nexists$	<code>\nHdownarrow^*</code>	$\nexists$	<code>\nvLeftrightarrow</code>
$\nexists$	<code>\nHuparrow^*</code>	$\nexists$	<code>\nRightarrow</code>
$\nLeftarrow$	<code>\nleftarrow^{\dagger}</code>	$\nexists$	<code>\nvRightarrow</code>
$\nLeftarrow$	<code>\nLeftarrow</code>	$\nexists$	<code>\nvrightarrow</code>
$\nLeftrightarrow$	<code>\nleftrightharpoonup</code>	$\nexists$	<code>\nVrightarrowtail</code>
$\nLeftrightarrow$	<code>\nleftrightharpoonup</code>	$\nexists$	<code>\nvrightarrowtail</code>
$\nRightarrow$	<code>\nRightarrow</code>	$\nexists$	<code>\nvtwoheadleftarrow</code>
$\nRightarrow$	<code>\nrightarrow</code>	$\nexists$	<code>\nVtwoheadleftarrow</code>
$\nLeftarrow$	<code>\nvleftarrow</code>	$\nexists$	<code>\nvtwoheadleftarrowtail</code>
$\nLeftarrow$	<code>\nvLeftarrow</code>	$\nexists$	<code>\nVtwoheadleftarrowtail</code>
$\nLeftrightarrow$	<code>\nVleftarrow</code>	$\nexists$	<code>\nVtwoheadrightarrow</code>
$\nLeftrightarrow$	<code>\nVleftarrowtail</code>	$\nexists$	<code>\nVtwoheadrightarrow</code>
$\nLeftarrow$	<code>\nvleftarrowtail</code>	$\nexists$	<code>\nVtwoheadrightarrowtail</code>
$\nLeftrightarrow$	<code>\nvleftrightharpoonup</code>	$\nexists$	<code>\nVtwoheadrightarrowtail</code>
$\nRightarrow$	<code>\nVleftrightharpoonup</code>		

\* Defined as an ordinary character, not as a binary relation.

<sup>†</sup> stix defines `\ngets` as a synonym for `\nleftarrow`.

TABLE 177: stix Harpoons

\barwedge	\bardownharpoonleft	\leftrightharpoons	\leftrightharpoons
\barwedge	\bardownharpoonright	\leftrightharpoons	\leftrightharpoonsdown
\barwedge	\barleftharpoondown	\leftrightharpoons	\leftrightharpoonsup
\barwedge	\barleftharpoonup	\leftrightharpoons	\leftrightharpoonupdown
\barwedge	\barrightharpoondown	\leftrightharpoons	\leftrightharpoonupup
\barwedge	\barrightharpoonup	\rightarrow	\rightharpoondown
\barwedge	\barupharpoonleft	\rightarrow	\rightharpoondownbar
\barwedge	\barupharpoonright	\rightarrow	\rightharpoonsdown
=	\dashleftharpoondown	\rightarrow	\rightharpoonup
=	\dashrightharpoondown	\rightarrow	\rightharpoonupbar
\downarrow	\downharpoonleft	\rightarrow	\rightharpoonupdash
\downarrow	\downharpoonleftbar	\Rightarrow	\rightleftharpoons
\downarrow	\downharpoonright	\Rightarrow	\rightleftharpoonsdown
\downarrow	\downharpoonrightbar	\Rightarrow	\rightleftharpoonsup
\Downarrow	\downharpoonsleftright	\uparrow	\updownharpoonleftleft
\Downarrow	\downupharpoonsleftright	\uparrow	\updownharpoonleftright
\Downarrow	\leftharpoondown	\uparrow	\updownharpoonrightleft
\Downarrow	\leftharpoondownbar	\uparrow	\updownharpoonrightright
\Leftrightarrow	\leftharpoonsdown	\uparrow	\updownharpoonsleftright
\Leftrightarrow	\leftharpoonup	\uparrow	\upharpoonleft
\Leftrightarrow	\leftharpoonupbar	\uparrow	\upharpoonleftbar
\Leftrightarrow	\leftharpoonupdash	\uparrow	\upharpoonright*
\Rrightarrow	\leftrightharpoondowndown	\uparrow	\upharpoonrightbar
\Rrightarrow	\leftrightharpoonupdownup	\uparrow	\upharpoonsleftright

\* stix defines \restriction as a synonym for \upharpoonright.

TABLE 178: pdfMsym Arrows

\lightning	\lightning	\varLeftarrow	\varLeftarrow
\longvarCircleleftarrow	\longvarCircleleftarrow	\varcircleleftarrow	\varcircleleftarrow
\longvarcirclearrowleft	\longvarcirclearrowleft	\varcirclearrowleft	\varcirclearrowleft
\longvarCirclerightarrow	\longvarCirclerightarrow	\varcirclerightarrow	\varcirclerightarrow
\longvarcirclearrowright	\longvarcirclearrowright	\varcirclearrowright	\varcirclearrowright
\longvardoubleleftarrow	\longvardoubleleftarrow	\vardoubleleftarrow	\vardoubleleftarrow
\longvardoublerightarrow	\longvardoublerightarrow	\vardoublerightarrow	\vardoublerightarrow
\longvardownhookleftarrow	\longvardownhookleftarrow	\vardownhookleftarrow	\vardownhookleftarrow

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$\rightarrow$	<code>\longvardownhookrightarrow</code>	$\rightarrow$	<code>\vardownhookrightarrow</code>
$\Leftarrow$	<code>\longvarLeftarrow</code>	$\Leftarrow$	<code>\varLeftarrow</code>
$\leftarrow$	<code>\longvarleftarrow</code>	$\leftarrow$	<code>\varleftarrow</code>
$\Leftarrow\Leftarrow$	<code>\longvarleftarrows</code>	$\Leftarrow\Leftarrow$	<code>\varleftarrows</code>
$\rightarrow\rightarrow$	<code>\longvarleftrightarrow</code>	$\rightarrow\rightarrow$	<code>\varleftrightarrow</code>
$\Leftarrow\rightarrow$	<code>\longvarleftrightharpoons</code>	$\Leftarrow\rightarrow$	<code>\varleftrightharpoons</code>
$\Leftarrow\Leftarrow$	<code>\longvarLleftarrow</code>	$\Leftarrow\Leftarrow$	<code>\varLleftarrow</code>
$\Leftarrow\Rightarrow$	<code>\longvarLleftRrightarrow</code>	$\Leftarrow\Rightarrow$	<code>\varLleftRrightarrow</code>
$\leftarrow\leftarrow$	<code>\longvarmapsfrom</code>	$\leftarrow\leftarrow$	<code>\varmapsfrom</code>
$\rightarrow\rightarrow$	<code>\longvarmapsto</code>	$\rightarrow\rightarrow$	<code>\varmapsto</code>
$\Leftarrow\rightarrow$	<code>\longvarRibbonleftarrow</code>	$\Leftarrow\rightarrow$	<code>\varRibbonleftarrow</code>
$\Rightarrow\rightarrow$	<code>\longvarRibbonrightarrow</code>	$\Rightarrow\rightarrow$	<code>\varRibbonrightarrow</code>
$\rightarrow\rightarrow$	<code>\longvarRightarrow</code>	$\rightarrow\rightarrow$	<code>\varRightarrow</code>
$\rightarrow\rightarrow$	<code>\longvarrightarrow</code>	$\rightarrow\rightarrow$	<code>\varrightarrow</code>
$\Rightarrow\Rightarrow$	<code>\longvarrightarrows</code>	$\Rightarrow\Rightarrow$	<code>\varrightarrows</code>
$\Leftarrow\rightarrow$	<code>\longvarrightleftarrows</code>	$\Leftarrow\rightarrow$	<code>\varrightleftarrows</code>
$\Rightarrow\Rightarrow$	<code>\longvarRrightarrow</code>	$\Rightarrow\Rightarrow$	<code>\varRrightarrow</code>
$\Leftarrow\rightarrow$	<code>\longvarSquareleftarrow</code>	$\Leftarrow\rightarrow$	<code>\varSquareleftarrow</code>
$\Rightarrow\rightarrow$	<code>\longvarSquarerightarrow</code>	$\Rightarrow\rightarrow$	<code>\varSquarerightarrow</code>
$\leftarrow\leftarrow$	<code>\longvaruphookleftarrow</code>	$\leftarrow\leftarrow$	<code>\varuphookleftarrow</code>
$\rightarrow\rightarrow$	<code>\longvaruphookrightarrow</code>	$\rightarrow\rightarrow$	<code>\varuphookrightarrow</code>

`pdfMsym` symbols are implemented with PDF literals instead of (or sometimes in conjunction) with a font. All symbols can be rendered by `pdflATEX` and `LuaLATEX`, some by `XeLATEX`, and none by most other `TEX` backends.

TABLE 179: `pdfMsym` Harpoons

$\leftarrow$	<code>\longvarleftharp</code>	$\leftarrow$	<code>\varleftharp</code>
$\rightarrow$	<code>\longvarleftrightharp</code>	$\rightarrow$	<code>\varleftrightharp</code>
$\rightarrow$	<code>\longvarrightharp</code>	$\rightarrow$	<code>\varrightharp</code>
$\rightarrow$	<code>\longvarrightleftharp</code>	$\rightarrow$	<code>\varrightleftharp</code>

`pdfMsym` symbols are implemented with PDF literals instead of (or sometimes in conjunction) with a font. All symbols can be rendered by `pdflATEX` and `LuaLATEX`, some by `XeLATEX`, and none by most other `TEX` backends.

TABLE 180: `chemarrow` Arrows

$\rightarrow$  `\chemarrow`

TABLE 181: `fge` Arrows

$\rightarrow$  `\fgerightarrow`       $\uparrow$  `\fgeuparrow`

TABLE 182: old-arrows Arrows

$\downarrow$	<code>\downarrow</code>	$\longleftrightarrow$	<code>\longleftrightarrow</code>	$\nwarrow$	<code>\nwarrow</code>
$\hookleftarrow$	<code>\hookleftarrow</code>	$\longleftrightarrow$	<code>\longmapsfrom^*</code>	$\rightarrow$	<code>\rightarrow</code>
$\hookrightarrow$	<code>\hookrightarrow</code>	$\longrightarrow$	<code>\longmapsto</code>	$\searrow$	<code>\searrow</code>
$\leftarrow$	<code>\leftarrow</code>	$\longrightarrow$	<code>\longrightarrow</code>	$\swarrow$	<code>\swarrow</code>
$\leftrightarrow$	<code>\leftrightarrow</code>	$\longleftrightarrow$	<code>\mapsfrom^*</code>	$\uparrow$	<code>\uparrow</code>
$\longleftarrow$	<code>\longleftarrow</code>	$\longrightarrow$	<code>\mapsto</code>	$\updownarrow$	<code>\updownarrow</code>
$\longleftarrowtail$	<code>\longleftarrowtail</code>	$\nearrow$	<code>\nearrow</code>		

The arrows provided by `old-arrows` represent Donald Knuth's pre-1992 Computer Modern glyphs, which feature smaller arrowheads. Contrast the following:

$$\begin{array}{ccc} \longrightarrow & \text{vs.} & \longrightarrow \\ \text{default} & & \text{old-arrows} \end{array}$$

In addition to the arrows shown above, `old-arrows` also reduces the arrowhead size for  $\overleftarrow$ ,  $\overrightarrow$ ,  $\overleftarrowright$ ,  $\underleftarrow$ ,  $\underrightarrow$ ,  $\underleftarrowright$ ,  $\xleftarrow$ ,  $\xrightarrow$ ,  $\varinjlim$ , and  $\varprojlim$  symbols (Table 204 on page 119, Table 270 on page 139, and Table 288 on page 145) and `mathtools`'s  $\xleftarrow$ ,  $\xhookleftarrow$ ,  $\xhookrightarrow$ , and  $\xmapsto$  symbols (Table 289 on page 145).

With the new package option, `old-arrows` prefixes all of the above with "var" (i.e.,  $\vardownarrow$ ,  $\varrightarrow$ ,  $\varleftarrowright$ , etc.) so both old and new glyphs can be used in the same document. See the `old-arrows` documentation for more information.

\* Requires `stmaryrd`.

TABLE 183: old-arrows Harpoons

$\longleftharpoonup$	<code>\longleftharpoonup</code>	$\longrightarrow$	<code>\longrightharpoonup</code>
$\longleftharpoondown$	<code>\longleftharpoondown</code>	$\longrightarrow$	<code>\longrightharpoondown</code>

Unlike the symbols shown in Table 182, the new package option does not define a  $\var...$  version of the symbols in this table. Also unlike the symbols shown in Table 182, the harpoon arrowheads in this table are not reduced in size (i.e., relative to the size of those shown in Table 154 on page 94).

TABLE 184: logix Arrows

$\leftarrow\!\!\!\leftarrow$	<code>\DashArrowLeft</code>	$\implies$	<code>\LMtImpl</code>	$\leftrightarrow$	<code>\RplcFree</code>
$\dashrightarrow$	<code>\DashArrowRight</code>	$\leftrightarrow\!\!\!$	<code>\LoopArrowLeft</code>	$\leftarrow$	<code>\RplcFreeLeft</code>
$\rightarrow$	<code>\Entail</code>	$\leftrightarrow$	<code>\LoopArrowRight</code>	$\rightarrow$	<code>\RplcFreeRight</code>
$\leftrightarrow$	<code>\EntailEquiv</code>	$\rightarrow\!\!\!$	<code>\LParFunc</code>	$\rightarrow$	<code>\SEntail</code>
$\leftrightarrow$	<code>\Equiv</code>	$\rightarrow$	<code>\LWkEntail</code>	$\leftrightarrow\!\!\!$	<code>\SEntailEquiv</code>
$\Leftarrow\!\!\!\Leftarrow$	<code>\FishArrowLeft</code>	$\leftrightarrow\!\!\!$	<code>\LWkEntailEquiv</code>	$\leftrightarrow\!\!\!$	<code>\SEquiv</code>
$\Rightarrow\!\!\!\Rightarrow$	<code>\FishArrowRight</code>	$\not\rightarrow$	<code>\MapParInGndMul</code>	$\rightarrow$	<code>\SFunc</code>
$\leftarrow\!\!\!\leftarrow$	<code>\FlatArrowLeft</code>	$\not\leftrightarrow$	<code>\MapParInGndOne</code>	$\downarrow$	<code>\ShftAccent</code>
$\rightarrow\!\!\!\rightarrow$	<code>\FlatArrowRight</code>	$\not\leftrightarrow$	<code>\MapParInGndSng</code>	$\downarrow$	<code>\ShftSubscr</code>
$\leftarrow\!\!\!\leftarrow$	<code>\ForkArrowLeft</code>	$\not\rightarrow$	<code>\MapParInMul</code>	$\uparrow$	<code>\ShftSuper</code>
$\Rightarrow\!\!\!\Rightarrow$	<code>\ForkArrowRight</code>	$\not\leftrightarrow$	<code>\MapParInOne</code>	$\rightarrow$	<code>\SImpl</code>
$\rightarrow$	<code>\Func</code>	$\rightarrow\!\!\!$	<code>\MapParInSng</code>	$\rightarrow$	<code>\SMapTo</code>
$\leftarrow\!\!\!\leftarrow$	<code>\FunParInGndMul</code>	$\not\rightarrow\!\!\!$	<code>\MapParOnGndMul</code>	$\leftrightarrow\!\!\!$	<code>\SMTequiv</code>
$\leftarrow\!\!\!\leftarrow$	<code>\FunParInGndOne</code>	$\not\rightarrow\!\!\!$	<code>\MapParOnGndOne</code>	$\rightarrow\!\!\!$	<code>\SMTImpl</code>
$\leftarrow\!\!\!\leftarrow$	<code>\FunParInGndSng</code>	$\not\rightarrow\!\!\!$	<code>\MapParOnGndSng</code>	$\rightarrow\!\!\!$	<code>\SParFunc</code>
$\leftarrow\!\!\!\leftarrow$	<code>\FunParInMul</code>	$\not\rightarrow\!\!\!$	<code>\MapParOnMul</code>	$\rightarrow\!\!\!$	<code>\SWkEntail</code>
$\leftarrow\!\!\!\leftarrow$	<code>\FunParInOne</code>	$\not\rightarrow\!\!\!$	<code>\MapParOnOne</code>	$\leftrightarrow\!\!\!$	<code>\SWkEntailEquiv</code>
$\leftarrow\!\!\!\leftarrow$	<code>\FunParInSng</code>	$\not\rightarrow\!\!\!$	<code>\MapParOnSng</code>	$\longrightarrow$	<code>\VENTail</code>
$\leftarrow\!\!\!\leftarrow$	<code>\FunParOnGndMul</code>	$\not\rightarrow\!\!\!$	<code>\MapTo</code>	$\leftrightarrow\!\!\!$	<code>\VENTailEquiv</code>
$\leftarrow\!\!\!\leftarrow$	<code>\FunParOnGndOne</code>	$\not\rightarrow\!\!\!$	<code>\MapTotInGndMul</code>	$\leftrightarrow\!\!\!$	<code>\VEquiv</code>
$\leftarrow\!\!\!\leftarrow$	<code>\FunParOnGndSng</code>	$\not\rightarrow\!\!\!$	<code>\MapTotInGndOne</code>	$\longrightarrow$	<code>\VFunc</code>
$\leftarrow\!\!\!\leftarrow$	<code>\FunParOnMul</code>	$\not\rightarrow\!\!\!$	<code>\MapTotInGndSng</code>	$\longrightarrow$	<code>\VImpl</code>
$\leftarrow\!\!\!\leftarrow$	<code>\FunParOnOne</code>	$\not\rightarrow\!\!\!$	<code>\MapTotInMul</code>	$\longrightarrow$	<code>\VMapTo</code>
$\leftarrow\!\!\!\leftarrow$	<code>\FunParOnSng</code>	$\not\rightarrow\!\!\!$	<code>\MapTotInOne</code>	$\leftrightarrow\!\!\!$	<code>\VMTequiv</code>
$\leftarrow\!\!\!\leftarrow$	<code>\FunTotInGndMul</code>	$\not\rightarrow\!\!\!$	<code>\MapTotInSng</code>	$\longrightarrow$	<code>\VMTImpl</code>
$\leftarrow\!\!\!\leftarrow$	<code>\FunTotInGndOne</code>	$\not\rightarrow\!\!\!$	<code>\MapTotOnGndMul</code>	$\longrightarrow$	<code>\VParFunc</code>
$\leftarrow\!\!\!\leftarrow$	<code>\FunTotInGndSng</code>	$\not\rightarrow\!\!\!$	<code>\MapTotOnGndOne</code>	$\longrightarrow$	<code>\VWkEntail</code>
$\leftarrow\!\!\!\leftarrow$	<code>\FunTotInMul</code>	$\not\rightarrow\!\!\!$	<code>\MapTotOnGndSng</code>	$\leftrightarrow\!\!\!$	<code>\VWkEntailEquiv</code>
$\leftarrow\!\!\!\leftarrow$	<code>\FunTotInOne</code>	$\not\rightarrow\!\!\!$	<code>\MapTotOnMul</code>	$\rightsquigarrow$	<code>\WavyArrowLeft</code>
$\leftarrow\!\!\!\leftarrow$	<code>\FunTotInSng</code>	$\not\rightarrow\!\!\!$	<code>\MapTotOnOne</code>	$\rightsquigarrow$	<code>\WavyArrowRight</code>
$\leftarrow\!\!\!\leftarrow$	<code>\FunTotOnGndMul</code>	$\not\rightarrow\!\!\!$	<code>\MapTotOnSng</code>	$\rightarrow\!\!\!$	<code>\WkEntail</code>
$\leftarrow\!\!\!\leftarrow$	<code>\FunTotOnGndOne</code>	$\not\leftrightarrow\!\!\!$	<code>\MtEquiv</code>	$\leftrightarrow\!\!\!$	<code>\WkEntailEquiv</code>
$\leftarrow\!\!\!\leftarrow$	<code>\FunTotOnGndSng</code>	$\not\rightarrow\!\!\!$	<code>\MtImpl</code>	$\rightarrow\!\!\!$	<code>\XEntail</code>
$\leftarrow\!\!\!\leftarrow$	<code>\FunTotOnMul</code>	$\not\rightarrow\!\!\!$	<code>\ParFunc</code>	$\leftrightarrow\!\!\!$	<code>\XEntailEquiv</code>
$\leftarrow\!\!\!\leftarrow$	<code>\FunTotOnOne</code>	$\not\leftrightarrow\!\!\!$	<code>\RplcAll</code>	$\leftrightarrow\!\!\!$	<code>\XEquiv</code>
$\leftarrow\!\!\!\leftarrow$	<code>\FunTotOnSng</code>	$\not\leftrightarrow\!\!\!$	<code>\RplcAllBnd</code>	$\rightarrow\!\!\!$	<code>\XFunc</code>
$\leftarrow\!\!\!\leftarrow$	<code>\HookArrowLeft</code>	$\leftarrow$	<code>\RplcAllBndLeft</code>	$\rightarrow\!\!\!$	<code>\XImpl</code>
$\leftarrow\!\!\!\leftarrow$	<code>\HookArrowRight</code>	$\rightarrow$	<code>\RplcAllBndRight</code>	$\longrightarrow$	<code>\XMapTo</code>
$\rightarrow\!\!\!\rightarrow$	<code>\Impl</code>	$\leftarrow$	<code>\RplcAllLeft</code>	$\leftrightarrow\!\!\!$	<code>\XMTequiv</code>
$\rightarrow\!\!\!\rightarrow$	<code>\LEntail</code>	$\rightarrow$	<code>\RplcAllRight</code>	$\Longrightarrow\!\!\!$	<code>\XMTImpl</code>
$\leftarrow\!\!\!\leftarrow$	<code>\LEntailEquiv</code>	$\leftrightarrow\!\!\!$	<code>\RplcAny</code>	$\rightarrow\!\!\!$	<code>\XParFunc</code>
$\leftarrow\!\!\!\leftarrow$	<code>\LEquiv</code>	$\leftarrow$	<code>\RplcAnyLeft</code>	$\rightarrow\!\!\!$	<code>\XWkEntail</code>
$\rightarrow\!\!\!\rightarrow$	<code>\LFunc</code>	$\rightarrow$	<code>\RplcAnyRight</code>	$\leftrightarrow\!\!\!$	<code>\XWkEntailEquiv</code>

*(continued on next page)*

(continued from previous page)

$\rightarrow$	<code>\LImpl</code>	$\leftrightarrow$	<code>\RplcEquiv</code>	$\rightsquigarrow$	<code>\ZigArrowLeft</code>
$\mapsto$	<code>\LMapTo</code>	$\leftarrow$	<code>\RplcEquivLeft</code>	$\rightsquigleftarrow$	<code>\ZigArrowRight</code>
$\iff$	<code>\LMtEquiv</code>	$\rightarrow$	<code>\RplcEquivRight</code>		

logix requires either  $\text{Lua}\text{\LaTeX}$  or  $\text{Xe}\text{\LaTeX}$ .

TABLE 185: logix Negated Arrows

$\not\rightarrow$	<code>\NotEntail</code>	$\not\rightarrow$	<code>\NotSEntail</code>	$\not\rightarrow$	<code>\NotVWkEntail</code>
$\not\leftrightarrow$	<code>\NotEntailEquiv</code>	$\not\leftrightarrow$	<code>\NotSEntailEquiv</code>	$\not\leftrightarrow$	<code>\NotVWkEntailEquiv</code>
$\not\leftrightarrow$	<code>\NotEquiv</code>	$\not\leftrightarrow$	<code>\NotSEquiv</code>	$\not\rightarrow$	<code>\NotWkEntail</code>
$\not\rightarrow$	<code>\NotImpl</code>	$\not\rightarrow$	<code>\NotSImpl</code>	$\not\leftrightarrow$	<code>\NotWkEntailEquiv</code>
$\not\rightarrow$	<code>\NotLEntail</code>	$\not\leftrightarrow$	<code>\NotSMtEquiv</code>	$\not\rightarrow$	<code>\NotXEntail</code>
$\not\leftrightarrow$	<code>\NotLEntailEquiv</code>	$\not\Rightarrow$	<code>\NotSMtImpl</code>	$\not\leftrightarrow$	<code>\NotXEntailEquiv</code>
$\not\leftrightarrow$	<code>\NotLEquiv</code>	$\not\rightarrow$	<code>\NotSWkEntail</code>	$\not\leftrightarrow$	<code>\NotXEquiv</code>
$\not\rightarrow$	<code>\NotLImpl</code>	$\not\leftrightarrow$	<code>\NotSWkEntailEquiv</code>	$\not\rightarrow$	<code>\NotXIImpl</code>
$\not\leftrightarrow$	<code>\NotLMtEquiv</code>	$\not\rightarrow$	<code>\NotVEntail</code>	$\not\leftrightarrow$	<code>\NotXMtEquiv</code>
$\not\Rightarrow$	<code>\NotLMtImpl</code>	$\not\leftrightarrow$	<code>\NotVEntailEquiv</code>	$\not\Rightarrow$	<code>\NotXMtImpl</code>
$\not\rightarrow$	<code>\NotLWkEntail</code>	$\not\leftrightarrow$	<code>\NotVEquiv</code>	$\not\rightarrow$	<code>\NotXWkEntail</code>
$\not\leftrightarrow$	<code>\NotLWkEntailEquiv</code>	$\not\rightarrow$	<code>\NotVImpl</code>	$\not\leftrightarrow$	<code>\NotXWkEntailEquiv</code>
$\not\leftrightarrow$	<code>\NotMtEquiv</code>	$\not\Rightarrow$	<code>\NotVMtEquiv</code>		
$\not\Rightarrow$	<code>\NotMtImpl</code>	$\not\Rightarrow$	<code>\NotVMtImpl</code>		

logix requires either  $\text{Lua}\text{\LaTeX}$  or  $\text{Xe}\text{\LaTeX}$ .

TABLE 186: logix Harpoons

$\overleftarrow{-}$	<code>\HarpoonDnLeft</code>	$\overleftarrow{-}$	<code>\HarpoonUpLeft</code>
$\overrightarrow{-}$	<code>\HarpoonDnRight</code>	$\overrightarrow{-}$	<code>\HarpoonUpRight</code>

logix requires either  $\text{Lua}\text{\LaTeX}$  or  $\text{Xe}\text{\LaTeX}$ .

TABLE 187: logix Implications and Equivalences

$\vDash \exists$	<code>\InEquiv</code>	$\vDash \exists$	<code>\SInEquiv</code>	$\Longleftarrow$	<code>\VWkEquiv</code>	$\vDash \exists$	<code>\XInEquiv</code>
$\dashv \exists$	<code>\InImpl</code>	$\dashv \exists$	<code>\SInImpl</code>	$\longrightarrow$	<code>\VWkImpl</code>	$\dashv \exists$	<code>\XInImpl</code>
$\vDash \exists$	<code>\LInEquiv</code>	$\Leftrightarrow$	<code>\SWkEquiv</code>	$\Longleftrightarrow$	<code>\VWkMtEquiv</code>	$\Leftrightarrow$	<code>\XWkEquiv</code>
$\dashv \exists$	<code>\LInImpl</code>	$\rightarrow$	<code>\SWkImpl</code>	$\Longrightarrow$	<code>\VWkMtImpl</code>	$\dashv \exists$	<code>\XWkImpl</code>
$\dashv \exists$	<code>\LWkEquiv</code>	$\Leftrightarrow$	<code>\SWkMtEquiv</code>	$\Leftrightarrow$	<code>\WkEquiv</code>	$\Leftrightarrow$	<code>\XWkMtEquiv</code>
$\dashv \exists$	<code>\LWkImpl</code>	$\Rightarrow$	<code>\SWkMtImpl</code>	$\rightarrow$	<code>\WkImpl</code>	$\Longrightarrow$	<code>\XWkMtImpl</code>
$\dashv \exists$	<code>\LWkMtEquiv</code>	$\vDash \exists$	<code>\VInEquiv</code>	$\Leftrightarrow$	<code>\WkMtEquiv</code>		
$\dashv \exists$	<code>\LWkMtImpl</code>	$\dashv \exists$	<code>\VInImpl</code>	$\Rightarrow$	<code>\WkMtImpl</code>		

logix requires either  $\text{Lua}\text{\LaTeX}$  or  $\text{Xe}\text{\LaTeX}$ .

TABLE 188: logix Negated Implications and Equivalences

$\varepsilon/\exists$	<code>\NotInEquiv</code>	$\not\Rightarrow$	<code>\NotSwkEquiv</code>	$\not\Leftrightarrow$	<code>\NotWkEquiv</code>
$\not\exists$	<code>\NotInImpl</code>	$\not\Rightarrow$	<code>\NotSwkImpl</code>	$\not\Rightarrow$	<code>\NotWkImpl</code>
$\varepsilon/\exists$	<code>\NotLInEquiv</code>	$\not\Leftrightarrow$	<code>\NotSwkMtEquiv</code>	$\not\Leftrightarrow$	<code>\NotWkMtEquiv</code>
$\not\exists$	<code>\NotLInImpl</code>	$\not\Leftrightarrow$	<code>\NotSwkMtImpl</code>	$\not\Leftrightarrow$	<code>\NotWkMtImpl</code>
$\Leftrightarrow$	<code>\NotLWkEquiv</code>	$\varepsilon/\exists$	<code>\NotVInEquiv</code>	$\varepsilon/\exists$	<code>\NotXInEquiv</code>
$\not\Rightarrow$	<code>\NotLWkImpl</code>	$\not\exists$	<code>\NotVInImpl</code>	$\not\exists$	<code>\NotXInImpl</code>
$\not\Leftrightarrow$	<code>\NotLWkMtEquiv</code>	$\Leftrightarrow$	<code>\NotVWkEquiv</code>	$\Leftrightarrow$	<code>\NotXWkEquiv</code>
$\not\Leftrightarrow$	<code>\NotLWkMtImpl</code>	$\not\exists$	<code>\NotVWkImpl</code>	$\not\exists$	<code>\NotXWkImpl</code>
$\varepsilon/\exists$	<code>\NotSInEquiv</code>	$\not\Leftrightarrow$	<code>\NotVWkMtEquiv</code>	$\not\Leftrightarrow$	<code>\NotXWkMtEquiv</code>
$\not\exists$	<code>\NotSInImpl</code>	$\not\Leftrightarrow$	<code>\NotVWkMtImpl</code>	$\not\Leftrightarrow$	<code>\NotXWkMtImpl</code>

logix requires either `LuaLaTeX` or `XeLaTeX`.

TABLE 189: esrelation Restrictions

$\downarrow$	<code>\restrictbarb</code>	$\uparrow$	<code>\restrictmallet</code>	$\downarrow$	<code>\restrictwand</code>
$\uparrow$	<code>\restrictbarbup</code>	$\downarrow$	<code>\restrictmalletup</code>	$\uparrow$	<code>\restrictwandup</code>

TABLE 190: MnSymbol Spoons

$\downarrow$	<code>\downfilledspoon</code>	$\times^\circ$	<code>\nnespoon</code>	$\nwarrow$	<code>\nwfilledspoon</code>
$\downarrow$	<code>\downspoon</code>	$\times^\times$	<code>\nnwfilledspoon</code>	$\nwarrow$	<code>\nwspoon</code>
$\leftarrow$	<code>\leftfilledspoon</code>	$\times^\times$	<code>\nnwspoon</code>	$\rightarrow$	<code>\rightfilledspoon</code>
$\leftarrow$	<code>\leftspoon</code>	$\rightarrow\circ$	<code>\nrightfilledspoon</code>	$\rightarrow\circ$	<code>\rightspoon^*</code>
$\dagger$	<code>\ndownfilledspoon</code>	$\rightarrow\circ$	<code>\nrightspoon^*</code>	$\bullet$	<code>\sefilledspoon</code>
$\dagger$	<code>\ndownspoon</code>	$\times\bullet$	<code>\nsefilledspoon</code>	$\circ\bullet$	<code>\sespoon</code>
$\nearrow$	<code>\nefilledspoon</code>	$\times\circ$	<code>\nsespoon</code>	$\checkmark$	<code>\swfilledspoon</code>
$\nearrow$	<code>\nespoon</code>	$\times\checkmark$	<code>\nswfilledspoon</code>	$\checkmark\circ$	<code>\swspoon</code>
$\nearrow\circ$	<code>\nleftfilledspoon</code>	$\circ\checkmark$	<code>\nswspoon</code>	$\circ\bullet$	<code>\upfilledspoon</code>
$\nearrow\circ$	<code>\nleftspoon</code>	$\circ\bullet$	<code>\nupfilledspoon</code>	$\bullet\circ$	<code>\upspoon</code>
$\times^\bullet$	<code>\nnefilledspoon</code>	$\circ\bullet$	<code>\nupspoon</code>	$\circ\bullet$	

\* MnSymbol defines `\multimap` as a synonym for `\rightspoon` and `\nmultimap` as a synonym for `\nrightspoon`.

TABLE 191: MnSymbol Pitchforks

\downpitchfork	\nnwpitchfork	\rightpitchfork
\leftpitchfork	\nrightpitchfork	\sepitchfork
\ndownpitchfork	\nsepitchfork	\swpitchfork
\nepitchfork	\nswpitchfork	\uppitchfork
\nleftpitchfork	\nuppitchfork	
\nnepitchfork	\nwpitchfork	

\* MnSymbol defines \pitchfork as a synonym for \uppitchfork and \npitchfork as a synonym for \nuppitchfork.

TABLE 192: MnSymbol Smiles and Frowns

≈	\doublefrown	≯	\nsmileeq	≤	\smileeq
≣	\doublefrownneq	≷	\nsmileeqfrown	≣	\smileeqfrown
≣	\doublesmile	≷	\nsmilefrown	≣	\smilefrown
≣	\doublesmileeq	≷	\nsmilefrownneq	≣	\smilefrownneq
≣	\eqfrown	≷	\nsqddoublefrown	≣	\sqdoublefrown
≣	\eqsmile	≷	\nsqddoublefrownneq	≣	\sqdoublefrownneq
≣	\frown	≷	\nsqdoublesmile	≣	\sqdoublesmile
≣	\frownneq	≷	\nsqdoublesmileeq	≣	\sqdoublesmileeq
≣	\frowneqsmile	≷	\nsqeqlfrown	≣	\squeqlfrown
≣	\frownsmile	≷	\nsqeqlsmile	≣	\squeqlsmile
≣	\frownsmileeq	≷	\nsqfrown	≣	\sqfrown
≷	\ndoublefrown	≷	\nsqfrownneq	≣	\sqfrownneq
≷	\ndoublefrownneq	≷	\nsqfrownneqsmile	≣	\sqfrownneqsmile
≷	\ndoublesmile	≷	\nsqfrownsmile	≣	\sqfrownsmile
≷	\ndoublesmileeq	≷	\nsqsmile	≣	\sqsmile
≷	\neqlfrown	≷	\nsqsmileeq	≣	\sqsmileeq
≷	\neqlsmile	≷	\nsqsmileeqfrown	≣	\sqsmileeqfrown
≷	\nfrown	≷	\nsqsmilefrown	≣	\sqsmilefrown
≷	\frownneq	≷	\nsqtriplefrown	≣	\sqtriplefrown
≷	\frownneqsmile	≷	\nsqtriplesmile	≣	\sqtriplesmile
≷	\frownsmile	≷	\ntriplefrown	≣	\triplefrown
≷	\frownsmileeq	≷	\ntriplesmile	≣	\triplesmile
≣	\nsmile	≣	\smile	≣	\smile

\* MnSymbol defines `\smallsmile` as a synonym for `\smile`, `\smallfrown` as a synonym for `\frown`, `\asymp` as a synonym for `\smilefrown`, and `\nasym` as a synonym for `\nsmilefrown`.

TABLE 193: *fdsymbol* Spoons

•◦	\blackwhitespoon	†	\ndownblackspoon	‡	\nupblackspoon
◦	\downblackspoon	‡	\ndownspoon	§	\nupspoon
◊	\downspoon	◆	\leftblackspoon	▷◦	\whiteblackspoon
●	\leftblackspoon	◆◦	\leftrightblackspoon	●	\rightblackspoon
●◦	\leftrightblackspoon	▷◦	\leftrightspoon	○	\rightspoon
○◦	\leftrightspoon	◆	\leftspoon	↑	\upblackspoon
○	\leftspoon	◆◦	\rightblackspoon	↓	\upspoon
◦◦	\blackwhitespoon	▷◦	\rightspoon	○◦	\whiteblackspoon

*fdsymbol* defines synonyms for many of the preceding symbols:

◊	\cirmid	○	\multimapinv	▷◦	\nmultimap
○◦	\dualmap	‡	\ncirmid	▷◦	\nmultimapinv
●◦	\imageof	▷◦	\ndualmap	▷◦	\norigof
◊	\midcir	◆◦	\imageof	○◦	\origof
○	\multimap	†	\nmidcir		

TABLE 194: *fdsymbol* Pitchforks

Ψ	\downpitchfork	-≠	\leftpitchfork	≥	\rightpitchfork
≤	\leftpitchfork	≠	\rightpitchfork	↳	\uppitchfork
≠	\downpitchfork	↗	\uppitchfork		

*fdsymbol* defines \npitchfork as a synonym for \nuppitchfork and \pitchfork as a synonym for \uppitchfork.

TABLE 195: *fdsymbol* Smiles and Frowns

¬	\frown	≠	\nfrownneq	≢	\nsmilefrown
≡	\frownneq	≠	\nfrownsmile	~	\smile
≈	\frownsmile	+	\nsmile	≣	\smileeq
+	\nfrown	≠	\nsmileeq	×	\smilefrown

*fdsymbol* defines \arceq as a synonym for \frownneq, \asymp as a synonym for \smilefrown, \closure as a synonym for \frownsmile, \narceq as a synonym for \nfrownneq, \nasymp as a synonym for \nsmilefrown, \nclosure as a synonym for \nfrownsmile, \smallfrown as a synonym for \frown, and \smallsmile as a synonym for \smile.

TABLE 196: *halloweenmath* Brooms and Pitchforks

—∈	\hmleftpitchfork	—←	\leftbroom
≥—	\hmrightpitchfork	≥→	\rightbroom

TABLE 197: *ulsy* Contradiction Symbols

```
↳ \blitza    ↳ \blitzb    ↳ \blitzc    ↳ \blitzd    ↳ \blitze
```

TABLE 198: Extension Characters

```
- \relbar = \Relbar
```

TABLE 199: *stmaryrd* Extension Characters

```
/ \Arrownot + \Mapsfromchar + \Mapstochar
/ \arrownot + \mapsfromchar
```

TABLE 200: *txfonts/pffonts* Extension Characters

```
+ \Mappedfromchar # \Mmappedfromchar # \Mmapstochar
+ \mappedfromchar # \mmappedfromchar # \ mmapstochar
```

TABLE 201: *mathabx* Extension Characters

```
+ \mapsfromchar + \mapstochar
+ \Mapsfromchar + \Mapstochar
```

TABLE 202: *stix* Extension Characters

```
+ \lhook - \relbar \equiv \RRelbar
+ \mapsfromchar = \Relbar \equiv \Rrelbar
+ \mapstochar > \rhook
```

TABLE 203: Log-like Symbols

```
\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
```

Calling the above “symbols” may be a bit misleading.<sup>3</sup> Each log-like symbol merely produces the eponymous textual equivalent, but with proper surrounding spacing. See Section 12.4 for more information about log-like symbols. As `\bmod` and `\pmod` arguably are not symbols we refer the reader to the Short Math Guide for L<sup>A</sup>T<sub>E</sub>X [Dow00] for samples.

TABLE 204: *AMS* Log-like Symbols

inj lim	<code>\injlim</code>	$\varinjlim$	$\varprojlim$	$\varlimsup$
proj lim	<code>\projlim</code>	$\varprojlim$	$\varliminf$	$\varprojlim$

Load the `amsmath` package to get these symbols. See Section 12.4 for some additional comments regarding log-like symbols. As `\mod` and `\pmod` arguably are not symbols we refer the reader to the Short Math Guide for L<sup>A</sup>T<sub>E</sub>X [Dow00] for samples.

TABLE 205: *mismath* Log-like Symbols

adj	<code>\adj</code>	Conv	<code>\Conv</code>	id	<code>\id</code>	sech	<code>\sech</code>
arccot	<code>\arccot</code>	Cov	<code>\Cov</code>	Id	<code>\Id</code>	sgn	<code>\sgn</code>
arcosh	<code>\arcosh</code>	cov	<code>\cov</code>	im	<code>\im</code>	span	<code>\spa</code>
arcoth	<code>\arcoth</code>	csch	<code>\csch</code>	Im	<code>\Im^*</code>	tr	<code>\tr</code>
arcsch	<code>\arcsch</code>	$\overrightarrow{\text{curl}}$	<code>\curl</code>	lb	<code>\lb</code>	Var	<code>\Var</code>
arsech	<code>\arsech</code>	div	<code>\divg</code>	lcm	<code>\lcm</code>	Z	<code>\Zu</code>
arsinh	<code>\arsinh</code>	End	<code>\End</code>	rank	<code>\rank</code>		
artanh	<code>\artanh</code>	erf	<code>\erf</code>	Re	<code>\Re^*</code>		
Aut	<code>\Aut</code>	$\overrightarrow{\text{grad}}$	<code>\grad</code>	$\overrightarrow{\text{rot}}$	<code>\rot</code>		

\* *mismath* renames L<sup>A</sup>T<sub>E</sub>X's `\Re` and `\Im` (Table 223) to `\oldRe` and `\oldIm`.

TABLE 206: *mismath* Asymptotic Notation

O	<code>\bigo</code>	$\mathcal{O}$	<code>\bigO</code>	o	<code>\lito</code>
---	--------------------	---------------	--------------------	---	--------------------

TABLE 207: *QfA2e* Number Sets

C	<code>\Complex</code>	$\mathbb{Z}$	<code>\Integer</code>	N	<code>\Natural</code>	$\mathbb{Q}$	<code>\Rational</code>	R	<code>\Real</code>
C	<code>\COMPLEX</code>	$\mathbb{Z}$	<code>\INTEGER</code>	N	<code>\NATURAL</code>	$\mathbb{Q}$	<code>\RATIONAL</code>	R	<code>\REAL</code>

<sup>3</sup>Michael J. Downes prefers the more general term, “atomic math objects”.

TABLE 208: Greek Letters

$\alpha$	<code>\alpha</code>	$\theta$	<code>\theta</code>	$\circ$	<code>\circ</code>	$\tau$	<code>\tau</code>
$\beta$	<code>\beta</code>	$\vartheta$	<code>\vartheta</code>	$\pi$	<code>\pi</code>	$\upsilon$	<code>\upsilon</code>
$\gamma$	<code>\gamma</code>	$\iota$	<code>\iota</code>	$\varpi$	<code>\varpi</code>	$\phi$	<code>\phi</code>
$\delta$	<code>\delta</code>	$\kappa$	<code>\kappa</code>	$\rho$	<code>\rho</code>	$\varphi$	<code>\varphi</code>
$\epsilon$	<code>\epsilon</code>	$\lambda$	<code>\lambda</code>	$\varrho$	<code>\varrho</code>	$\chi$	<code>\chi</code>
$\varepsilon$	<code>\varepsilon</code>	$\mu$	<code>\mu</code>	$\sigma$	<code>\sigma</code>	$\psi$	<code>\psi</code>
$\zeta$	<code>\zeta</code>	$\nu$	<code>\nu</code>	$\varsigma$	<code>\varsigma</code>	$\omega$	<code>\omega</code>
$\eta$	<code>\eta</code>	$\xi$	<code>\xi</code>				
$\Gamma$	<code>\Gamma</code>	$\Lambda$	<code>\Lambda</code>	$\Sigma$	<code>\Sigma</code>	$\Psi$	<code>\Psi</code>
$\Delta$	<code>\Delta</code>	$\Xi$	<code>\Xi</code>	$\Upsilon$	<code>\Upsilon</code>	$\Omega$	<code>\Omega</code>
$\Theta$	<code>\Theta</code>	$\Pi$	<code>\Pi</code>	$\Phi$	<code>\Phi</code>		

The remaining Greek majuscules can be produced with ordinary Latin letters. The symbol “M”, for instance, is used for both an uppercase “m” and an uppercase “μ”. To make available commands for *all* of the Greek majuscules, either use the `mathspec` package, which requires X<sub>E</sub>T<sub>E</sub>X, or copy `mathspec.sty`’s Greek-letter definitions to your document’s preamble:

```
\DeclareMathSymbol{\Alpha}{\mathalpha}{operators}{41}
\DeclareMathSymbol{\Beta}{\mathalpha}{operators}{42}
\DeclareMathSymbol{\Epsilon}{\mathalpha}{operators}{45}
\DeclareMathSymbol{\Zeta}{\mathalpha}{operators}{5A}
\DeclareMathSymbol{\Eta}{\mathalpha}{operators}{48}
\DeclareMathSymbol{\Iota}{\mathalpha}{operators}{49}
\DeclareMathSymbol{\Kappa}{\mathalpha}{operators}{4B}
\DeclareMathSymbol{\Mu}{\mathalpha}{operators}{4D}
\DeclareMathSymbol{\Nu}{\mathalpha}{operators}{4E}
\DeclareMathSymbol{\Omicron}{\mathalpha}{operators}{4F}
\DeclareMathSymbol{\Rho}{\mathalpha}{operators}{50}
\DeclareMathSymbol{\Tau}{\mathalpha}{operators}{54}
\DeclareMathSymbol{\Chi}{\mathalpha}{operators}{58}
\DeclareMathSymbol{\omicron}{\mathord}{letters}{6F}
```

See Section 12.5 for examples of how to produce bold Greek letters.

The symbols in this table are intended to be used in mathematical typesetting. Greek body text can be typeset using the `babel` package’s `greek` (or `polutonikogreek`) option—and, of course, a font that provides the glyphs for the Greek alphabet.

TABLE 209: *AMS* Greek Letters

$F$  `\digamma`  $\varkappa$  `\varkappa`

TABLE 210: `txfonts/pxfonts` Upright Greek Letters

$\alpha$	<code>\alphaup</code>	$\theta$	<code>\thetaau</code>	$\pi$	<code>\piup</code>	$\phi$	<code>\phiiu</code>
$\beta$	<code>\betaau</code>	$\vartheta$	<code>\varthetaau</code>	$\varpi$	<code>\varpiup</code>	$\varphi$	<code>\varphiiu</code>
$\gamma$	<code>\gammaau</code>	$\iota$	<code>\iotaau</code>	$\rho$	<code>\rhoau</code>	$\chi$	<code>\chiiu</code>
$\delta$	<code>\deltaau</code>	$\kappa$	<code>\kappaau</code>	$\varrho$	<code>\varrhoau</code>	$\psi$	<code>\psiiu</code>
$\epsilon$	<code>\epsilonau</code>	$\lambda$	<code>\lambdaau</code>	$\sigma$	<code>\sigmaau</code>	$\omega$	<code>\omegaau</code>
$\varepsilon$	<code>\varepsilonau</code>	$\mu$	<code>\muau</code>	$\varsigma$	<code>\varsigmaau</code>		
$\zeta$	<code>\zetaau</code>	$\nu$	<code>\nuau</code>	$\tau$	<code>\tauau</code>		
$\eta$	<code>\etaau</code>	$\xi$	<code>\xiau</code>	$\upsilon$	<code>\upsilonau</code>		

The symbols in this table are intended to be used sporadically throughout a document (e.g., to represent mathematical units or numerical quantities—“ $\pi \approx 3.14159$ ”). In contrast, Greek body text can be typeset using the `babel` package’s `greek` (or `poltonikogreek`) option—and, of course, a font that provides the glyphs for the Greek alphabet.

TABLE 211: `upgreek` Upright Greek Letters

$\alpha$	<code>\upalpha</code>	$\theta$	<code>\uptheta</code>	$\pi$	<code>\uppi</code>	$\phi$	<code>\upphi</code>
$\beta$	<code>\upbeta</code>	$\vartheta$	<code>\upvartheta</code>	$\varpi$	<code>\upvarpi</code>	$\varphi$	<code>\upvarphi</code>
$\gamma$	<code>\upgamma</code>	$\iota$	<code>\upiota</code>	$\rho$	<code>\uprho</code>	$\chi$	<code>\upchi</code>
$\delta$	<code>\updelta</code>	$\kappa$	<code>\upkappa</code>	$\varrho$	<code>\upvarrho</code>	$\psi$	<code>\uppsi</code>
$\epsilon$	<code>\upepsilon</code>	$\lambda$	<code>\uplambda</code>	$\sigma$	<code>\upsigma</code>	$\omega$	<code>\upomega</code>
$\varepsilon$	<code>\upvarepsilon</code>	$\mu$	<code>\upmu</code>	$\varsigma$	<code>\upvarsigma</code>		
$\zeta$	<code>\upzeta</code>	$\nu$	<code>\upnu</code>	$\tau$	<code>\uptau</code>		
$\eta$	<code>\upeta</code>	$\xi$	<code>\upxi</code>	$\upsilon$	<code>\upupsilon</code>		
$\Gamma$	<code>\Upsilonigma</code>	$\Lambda$	<code>\Uplambda</code>	$\Sigma$	<code>\Upsilonigma</code>	$\Psi$	<code>\Upsilonpsi</code>
$\Delta$	<code>\Updelta</code>	$\Xi$	<code>\Upxi</code>	$\Upsilonigma$	<code>\Upupsilon</code>	$\Omega$	<code>\Upomega</code>
$\Theta$	<code>\Upsilontheta</code>	$\Pi$	<code>\Uppi</code>	$\Upsilonphi$			

`upgreek` utilizes upright Greek characters from either Euler Roman (depicted above) or the PostScript Symbol font. As a result, the glyphs may appear slightly different from the above. Contrast, for example, “ $\Gamma\Delta\Theta\alpha\beta\gamma$ ” (Euler) with “ $\Gamma\Delta\Theta\alpha\beta\gamma$ ” (Symbol). Also note that the `\var...` forms do not always produce a distinct glyph.

Unlike `textgreek` (Table 6 on page 20), `upgreek` works in math mode.

The symbols in this table are intended to be used sporadically throughout a document (e.g., to represent mathematical units or numerical quantities—“ $\pi \approx 3.14159$ ”). In contrast, Greek body text can be typeset using the `babel` package’s `greek` (or `poltonikogreek`) option—and, of course, a font that provides the glyphs for the Greek alphabet.

TABLE 212: fourier Variant Greek Letters

$\pi$	<code>\pi</code>	$\rho$	<code>\rho</code>
$\varpi$	<code>\varpi</code>	$\varrho$	<code>\varrho</code>
$\varvarpi$	<code>\varvarpi</code>	$\varvarrho$	<code>\varvarrho</code>

TABLE 213: txfonts/pxfonts Variant Latin Letters

$g$	<code>\varg</code>	$v$	<code>\varv</code>	$w$	<code>\varw</code>	$y$	<code>\vary</code>
-----	--------------------	-----	--------------------	-----	--------------------	-----	--------------------

Pass the `varg` option to `txfonts/pxfonts` to replace  $g$ ,  $v$ ,  $w$ , and  $y$  with  $g$ ,  $v$ ,  $w$ , and  $y$  in every mathematical expression in your document.

TABLE 214: boisik Variant Greek Letters

$\theta$	<code>\varbeta</code>	$\kappa$	<code>\varkappa</code>	$\varpi$	<code>\varpi</code>	$\varsigma$	<code>\varsigma</code>
$\epsilon$	<code>\varepsilon</code>	$\varphi$	<code>\varphi</code>	$\varrho$	<code>\varrho</code>	$\vartheta$	<code>\vartheta</code>

TABLE 215: boisik Variant Latin Letters

$g$	<code>\varg</code>
-----	--------------------

TABLE 216: stix Variant Greek Letters

$\varepsilon$	<code>\varepsilon</code>	$\varphi$	<code>\varphi</code>	$\varrho$	<code>\varrho</code>	$\vartheta$	<code>\vartheta</code>
$\kappa$	<code>\kappa</code>	$\varpi$	<code>\varpi</code>	$\varsigma$	<code>\varsigma</code>		

TABLE 217: stix Transformed Greek Letters

$\varepsilon$	<code>\backepsilon</code>	$\iota$	<code>\turnediota</code>
$\mho$	<code>\mho</code>	$\varepsilon$	<code>\upbackepsilon</code>

TABLE 218: *AMS* Hebrew Letters

$\beth$	<code>\beth</code>	$\gimel$	<code>\gimel</code>	$\daleth$	<code>\daleth</code>
---------	--------------------	----------	---------------------	-----------	----------------------

`\aleph` ( $\aleph$ ) appears in Table 334 on page 157.

TABLE 219: MnSymbol Hebrew Letters

$\aleph$	<code>\aleph</code>	$\beth$	<code>\beth</code>	$\gimel$	<code>\gimel</code>	$\daleth$	<code>\daleth</code>
----------	---------------------	---------	--------------------	----------	---------------------	-----------	----------------------

TABLE 220: *fdsymbol* Hebrew Letters

```
\aleph \beth \gimel \daleth
```

TABLE 221: *boisik* Hebrew Letters

```
\beth \gimel \daleth
```

TABLE 222: *stix* Hebrew Letters

```
\aleph \beth \gimel \daleth
```

TABLE 223: Letter-like Symbols

$\perp$	<code>\bot</code>	$\forall$	<code>\forallall</code>	$\imath$	<code>\imath</code>	$\ni$	<code>\ni</code>	$\top$	<code>\top</code>
$\ell$	<code>\ell</code>	$\hbar$	<code>\hbar</code>	$\in$	<code>\in</code>	$\partial$	<code>\partial</code>	$\wp$	<code>\wp</code>
$\exists$	<code>\exists</code>	$\Im$	<code>\Im</code>	$\jmath$	<code>\jmath</code>	$\Re$	<code>\Re</code>		

TABLE 224: *AMS* Letter-like Symbols

$\mathbb{k}$	<code>\Bbbk</code>	$\complement$	<code>\complement</code>	$\hbar$	<code>\hbar</code>
$\mathbb{R}$	<code>\circledR</code>	$\Finv$	<code>\Finv</code>	$\hslash$	<code>\hslash</code>
$\mathbb{S}$	<code>\circledS</code>	$\Game$	<code>\Game</code>	$\nexists$	<code>\nexists</code>

TABLE 225: *txfonts/pffonts* Letter-like Symbols

```
\mathcent \mathsterling* \notin \notni \notni
```

\* It's generally preferable to use the corresponding symbol from Table 3 on page 19 because the symbols in that table work properly in both text mode and math mode.

TABLE 226: *mathabx* Letter-like Symbols

$\bar{\in}$	<code>\barin</code>	$\in$	<code>\in</code>	$\not\top$	<code>\nottop</code>	$\notin$	<code>\notin</code>	$\varnotin$	<code>\varnotin</code>
$\complement$	<code>\complement</code>	$\nexists$	<code>\nexists</code>	$\owns$	<code>\owns</code>	$\not\owns$	<code>\notowns</code>	$\varnotowns$	<code>\varnotowns</code>
$\exists$	<code>\exists</code>	$\not\bot$	<code>\notbot</code>	$\not\equiv$	<code>\notequiv</code>	$\not\equiv$	<code>\notequiv</code>	$\varnotequiv$	<code>\varnotequiv</code>
$\Finv$	<code>\Finv</code>	$\not\in$	<code>\notin</code>	$\partial$	<code>\partial</code>	$\not\partial$	<code>\notpartial</code>	$\varnotpartial$	<code>\varnotpartial</code>
$\Game$	<code>\Game</code>	$\not\owns$	<code>\notowns</code>	$\not\partial$	<code>\notpartial</code>	$\not\partial$	<code>\notpartial</code>	$\varnotpartial$	<code>\varnotpartial</code>

TABLE 227: MnSymbol Letter-like Symbols

$\perp$	<code>\bot</code>	$\in$	<code>\in</code>	$\nexists$	<code>\nexists</code>	$\top$	<code>\top</code>
$\exists$	<code>\exists</code>	$\not\exists$	<code>\not\exists</code>	$\owns$	<code>\owns</code>	$\wp$	<code>\wp</code>
$\forall$	<code>\forall</code>	$\notin$	<code>\notin</code>	$\wp$	<code>\wp</code>	$\text{powerset}$	

MnSymbol provides synonyms `\notinin` for `\notin`, `\ni` for `\owns`, and `\intercal` for `\top`.

TABLE 228: fdsymbol Letter-like Symbols

$\perp$	<code>\bot</code>	$\forall$	<code>\forall</code>	$\in$	<code>\in</code>	$\exists$	<code>\owns</code>
$\complement$	<code>\complement</code>	$\Game$	<code>\Game</code>	$\nexists$	<code>\nexists</code>	$\top$	<code>\top</code>
$\exists$	<code>\exists</code>	$\hbar$	<code>\hbar</code>	$\notin$	<code>\notin</code>	$\wp$	<code>\wp</code>
$\dashv$	<code>\dashv</code>	$\Finv$	<code>\Finv</code>	$\hslash$	<code>\hslash</code>	$\nowns$	

fdsymbol provides synonyms `\notinin` for `\notin`, `\ni` for `\owns`, and `\nni` for `\nowns`.

TABLE 229: boisik Letter-like Symbols

$k$	<code>\Bbbk</code>	$\odot$	<code>\Game</code>	$i$	<code>\imath</code>	$\nexists$	<code>\nexists</code>
$\complement$	<code>\complement</code>	$h$	<code>\hbar</code>	$\top$	<code>\intercal</code>	$\wp$	<code>\wp</code>
$\dashv$	<code>\dashv</code>	$\Finv$	<code>\Finv</code>	$\hslash$	<code>\hslash</code>	$\jmath$	<code>\jmath</code>

TABLE 230: stix Letter-like Symbols

$\AA$	<code>\Angstrom</code>	$\mathcal{E}$	<code>\Eulerconst</code>	$i$	<code>\imath</code>	$\top$	<code>\top</code>
$\mathfrak{k}$	<code>\Bbbk</code>	$\exists$	<code>\exists</code>	$\intercal$	<code>\intercal</code>	$\topbot$	<code>\topbot</code>
$\perp$	<code>\bot</code>	$\dashv$	<code>\dashv</code>	$\jmath$	<code>\jmath</code>	$\wp$	<code>\wp</code>
$\circledR$	<code>\circledR</code>	$\forall$	<code>\forall</code>	$\mathcal{S}$	<code>\mathcal{S}</code>	$\Yup$	<code>\Yup</code>
$\circledS$	<code>\circledS</code>	$\odot$	<code>\Game</code>	$\mathcal{\mathit{mathdollar}}$	<code>\mathit{mathdollar}</code>	$\Zbar$	<code>\Zbar</code>
$\complement$	<code>\complement</code>	$h$	<code>\hbar</code>	$\mathcal{\mathit{mathsterling}}$	<code>\mathit{mathsterling}</code>		
$\digamma$	<code>\digamma</code>	$\hslash$	<code>\hslash</code>	$\nexists$	<code>\nexists</code>		
$\ell$	<code>\ell</code>	$\Im$	<code>\Im</code>	$\mathcal{R}$	<code>\Re</code>		

TABLE 231: trfsigns Letter-like Symbols

$e$	<code>\e</code>	$j$	<code>\im</code>
-----	-----------------	-----	------------------

TABLE 232: `mathdesign` Letter-like Symbols

$\in$	<code>\in</code>	$\ni$	<code>\owns</code>
$\notin$	<code>\notin</code>	$\in$	<code>\smallin</code>
$\not\in$	<code>\not\in</code>	$\not\in$	<code>\notsmallin</code>
$\not\ni$	<code>\not\ni</code>	$\ni$	<code>\smallowns</code>

The `mathdesign` package additionally provides versions of each of the letter-like symbols shown in Table 224.

TABLE 233: `fge` Letter-like Symbols

$\mathbb{V}$	<code>\fgeA</code>	$\mathbb{g}$	<code>\fgeeszett</code>	$\mathbb{m}$	<code>\fgeleftB</code>	$\mathbb{f}$	<code>\fges</code>
$\mathbb{z}$	<code>\fgec</code>	$\mathbb{H}$	<code>\fgeF</code>	$\mathbb{C}$	<code>\fgeleftC</code>		
$\mathbb{p}$	<code>\fged</code>	$\mathbb{J}$	<code>\fgef</code>	$\mathbb{N}$	<code>\fgemark*</code>		
$\mathbb{d}$	<code>\fgee</code>	$\mathbb{P}$	<code>\fgelb*</code>	$\mathbb{B}$	<code>\fgerightB</code>		

\* The `fge` package defines `\fgeeta`, `\fgeN`, and `\fgeoverU` as synonyms for `\fgelb` and `\fgeU` as a synonym for `\fgemark`.

TABLE 234: `fourier` Letter-like Symbols

$\partial$  `\partial`  $\partial$  `\varpartialdiff`

TABLE 235: `cml` Letter-like Symbols

$\bot$  `\Bot`  $\perp$  `\simbot`

TABLE 236: `logix` Proof Symbols

$\exists$	<code>\BnchExists</code>	$\perp$	<code>\Bot</code>	$\forall$	<code>\HdnForAll</code>	$\top$	<code>\TFBoth</code>
$\forall$	<code>\BnchForAll</code>	$\coloneqq$	<code>\Defn</code>	$\exists$	<code>\NFalse</code>	$\perp$	<code>\TFNone</code>
$\exists$	<code>\BnchHdnExists</code>	$\square$	<code>\End</code>	$\nexists$	<code>\NtExists</code>	$\top$	<code>\Top</code>
$\forall$	<code>\BnchHdnForAll</code>	$\exists$	<code>\Exists</code>	$\perp$	<code>\NTrue</code>	$\top$	<code>\True</code>
$\nexists$	<code>\BnchNtExists</code>	$\text{F}$	<code>\False</code>	$\top$	<code>\Qed</code>	$\exists!$	<code>\Unique</code>
$\exists!$	<code>\BnchUnique</code>	$\forall$	<code>\ForAll</code>	$\wedge$	<code>\QuantCon</code>		
$\lambda$	<code>\BndMap</code>	$\exists$	<code>\HdnExists</code>	$\vee$	<code>\QuantDis</code>		

`logix` requires either `LuaATEX` or `XATEX`.

TABLE 237: *endofproofwd* End-of-Proof Symbols
 \wasserdicht

\wasserdicht is implemented as an external PDF graphic. The command in fact typesets the symbol flush right on the page to signify the end of proof. To use the command in inline text, simply load the underlying graphic file directly:

```
\includegraphics[width=10pt]{endofproofwd.pdf}
```

TABLE 238: *AMS* Delimiters

⌈	\ulcorner	⌉	\urcorner
⌊	\llcorner	⌋	\lrcorner

TABLE 239: *stmaryrd* Delimiters

{	\Lbag	}	\Rbag	{	\lbag	}	\rbag
⌈	\lceil	⌉	\rceil	⌈	\lceil	⌉	\rceil
(	\lparenthesis	)	\rparenthesis	(	\lceil	)	\rceil

TABLE 240: *mathabx* Delimiters

[	\lcorners	]	\rcorners
⌈	\ulcorner	⌉	\urcorner
⌊	\llcorner	⌋	\lrcorner

TABLE 241: *boisik* Delimiters

⌈	\ulcorner	⌉	\urcorner
⌊	\llcorner	⌋	\lrcorner

TABLE 242: *stix* Delimiters

{	\langledot	}	\rangledot	<	\llangle	>	\rrangle
{	\lbag	}	\rbag	<	\llcorner	>	\lrcorner
{	\lblkbrbrak	}	\rblkbrbrak	<	\lpparenthesis	>	\rpparenthesis
[	\lbrackl tick	]	\rbrackl tick	\&	\Lparengtr	\&	\Rparenless
[	\lbrackkubar	]	\rbrackkubar	\&	\lparenless	\&	\rparengtr
[	\lbrackkultick	]	\rbrackkultick	\&	\lvzigzag	\&	\rvzigzag
{	\lbrakbrak	}	\rbrakbrak	\&	\Lvzigzag	\&	\Rvzigzag
<	\lcurvyangle	>	\rcurvyangle	<	\ulcorner	>	\urcorner

TABLE 243: `nath` Delimiters

\niv	\vin
------	------

TABLE 244: Variable-sized Delimiters

$\downarrow$	$\downarrow$	<code>\downarrow</code>	$\Downarrow$	<code>\Downarrow</code>	$[$	$[$	$]$	$]$
$\langle$	$\langle$	<code>\langle</code>	$\rangle$	<code>\rangle</code>	$ $	$ $	$\parallel$	<code>\parallel</code>
$\lceil$	$\lceil$	<code>\lceil</code>	<math\rceil< math=""></math\rceil<>	<code>\rceil</code>	$\uparrow$	$\uparrow$	$\Uparrow$	<code>\Uparrow</code>
$\lfloor$	$\lfloor$	<code>\lfloor</code>	<math\rceil< math=""></math\rceil<>	<code>\rceil</code>	$\updownarrow$	$\updownarrow$	$\Updownarrow$	<code>\Updownarrow</code>
$($	$($	<code>(</code>	$)$	<code>)</code>	$\{$	$\{$	$\}$	<code>\}</code>
$/$	$/$	$/$	$\backslash$	$\backslash$	<code>\backslash</code>			

When used with `\left` and `\right`, these symbols expand to the height of the enclosed math expression. Note that `\vert` is a synonym for `|`, and `\Vert` is a synonym for `\|`.

$\varepsilon$ -TEX provides a `\middle` analogue to `\left` and `\right`. `\middle` can be used, for example, to make an internal “ $|$ ” expand to the height of the surrounding `\left` and `\right` symbols. (This capability is commonly needed when typesetting adjacent bras and kets in Dirac notation: “ $\langle\phi|\psi\rangle$ ”). This is exactly what the `quantikz` package does (see Table 370 on page 171). A similar effect can be achieved in conventional LATEX using the `braket` package.

TABLE 245: Large, Variable-sized Delimiters

$\int$	$\int$	<code>\lmoustache</code>	$\Bigg\}$	<code>\rmoustache</code>	$\Bigg($	$\Bigg\{$	<code>\lgroup</code>	<code>\rgroup</code>
$ $	$ $	<code>\arrowvert</code>	$\parallel$	<code>\Arrowvert</code>	$ $	$ $	<code>\bracevert</code>	

These symbols *must* be used with `\left` and `\right`. The `mathabx` package, however, redefines `\lgroup` and `\rgroup` so that those symbols can work without `\left` and `\right`.

TABLE 246: *AMS* Variable-sized Delimiters

| | \lvert | \rvert  
|| || \lVert || \rVert

According to the `amsmath` documentation [AMS99], the preceding symbols are intended to be used as delimiters (e.g., as in “ $-z|$ ”) while the `\vert` and `\Vert` symbols (Table 244) are intended to be used as operators (e.g., as in  $p|q$ ).

TABLE 247: stmaryrd Variable-sized Delimiters

```
[[  [\llbracket      ]  \rrbracket]]
```

TABLE 248: mathabx Variable-sized Delimiters

```

[ [ \lbrack \ldbrack \lfilet \thickvert
] ] \rbrack \rdbrack \rfilet \vvvert

```

TABLE 249: MnSymbol Variable-sized Delimiters

```

||    \|Arrowvert { \lbrace ] } \rceil
|    | \arrowvert [ \lceil \lfloor ] \rfloor

```

*(continued on next page)*

(continued from previous page)

\	\backslash	\backslashbackslash	\lfloor	\lfloor	\lfloor	)	)	\rgroup
		\bracevert	(	(	\lgroup	{	{	\rmoustache
[	[	[	\langle	\langle	\langle	\rangle	\rangle	\rrangle
]	]	]	\llcorner	\llcorner	\llcorner	\rsem	\rsem	\rsem
(	(	(	\lmoustache	\lmoustache	\lmoustache	\rWavy	\rWavy	\rWavy
)	)	)	\lrcorner	\lrcorner	\lrcorner	\rwavey	\rwavey	\rwavey
/	/	/	\lsem	\lsem	\lsem	\ulcorner	\ulcorner	\ulcorner
{	{	<	\lwavey	\lwavey	\lwavey	\ullcorner	\ullcorner	\ullcorner
}	}	>	\lWavy	\lWavy	\lWavy	\ulrcorner	\ulrcorner	\ulrcorner
			\rangle	\rangle	\rangle	\urcorner	\urcorner	\urcorner
{	{	\langle	\rangle	\rangle	\rangle	\parallel	\parallel	\parallel
{	{	\langle	\rangle	\rangle	\rangle	\	\	\

\vert is a synonym for |. \Vert is a synonym for \|. \mid and \mvert produce the same symbol as \vert but designated as math relations instead of ordinals. \divides produces the same symbol as \vert but designated as a binary operator instead of an ordinal. \parallel and \mVert produce the same symbol as \Vert but designated as math relations instead of ordinals.

TABLE 250: *fdsymbol* Variable-sized Delimiters

\	\backslash	\backslashbackslash	\backslashlrcorner	)	\rparen
\downarrow	\downarrow	\downarrow\downarrow	\lvert	\lvert	\rvert
\Downarrow	\Downarrow	\Downarrow\Downarrow	\lVert	\lVert	\rVert
\langle	\langle	\langle\langle	\lVert\lVert	\lVert\lVert	\rVert\rVert
\langle	\langle	\langle\langle	\mathslash	\mathslash	\ulcorner
\langle	\langle	\langle\langle	\rangle	\rangle	\urcorner
\{	\{	\{	\rangle\}	\rangle\}	\ulrcorner
\[	\[	\[	\rangle\}	\rangle\}	\uparrow
\llbracket	\llbracket	\llbracket	\rangle\}	\rangle\}	\uparrow
\lceil	\lceil	\lceil	\rceil	\rceil	\uparrow
\lfloor	\lfloor	\lfloor	\rceil	\rceil	\uparrow
\lgroup	\lgroup	\lgroup	\rceil	\rceil	\uparrow
\rfloor	\rfloor	\rfloor	\lceil	\lceil	\uparrow

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$\int$	$\left\{ \backslash lmoustache \right.$	$\left. \right\} \backslash rgroup$	$\parallel$	$\left\  \backslash Vert$
$($	$\left( \backslash lparen \right.$	$\left. \right) \backslash rmoustache$	$\parallel\parallel$	$\left\  \backslash Vvert$

`fdsymbol` defines “ $($ ” as a synonym for `\lparen`, “ $)$ ” as a synonym for `\rparen`, “[” as a synonym for `\lbrack`, “ $]$ ” as a synonym for `\rbrack`, “ $\{$ ” as a synonym for `\lbrace`, “ $\}$ ” as a synonym for `\rbrace`, “ $/$ ” as a synonym for `\mathslash`, “ $|$ ” as a synonym for `\vert`, “ $\mid$ ” as a synonym for `\Vert`, `\lsem` as a synonym for `\lBrack`, and `\rsem` as a synonym for `\rBrack`.

TABLE 251: stix Variable-sized Delimiters

$\ \!\ $	<code>\Arrowvert</code>	$\langle\!\langle \backslash lAngle$	$\rangle\!\rangle \backslash rceil$
$\ $	<code>\arrowvert</code>	$\{ \backslash lbrace$	$\} \backslash rfloor$
$\backslash \backslash$	<code>\backslash</code>	$\{\!\{ \backslash lBrace$	$\}\!\} \backslash rgroup$
$\Downarrow \Downarrow$	<code>\Ddownarrow</code>	$\llbracket \backslash lBrack$	$\rrbracket \backslash rmoustache$
$\Downarrow \Downarrow$	<code>\DDownarrow</code>	$\langle \backslash lbrbrak$	$\rangle \backslash rParen$
$\downarrow \downarrow$	<code>\downarrow</code>	$\lceil \backslash lceil$	$\rceil \backslash uparrow$

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$\Downarrow$	$\Downarrow$	<code>\Downarrow</code>	$\lfloor$	$\lfloor$	<code>\lfloor</code>	$\Updownarrow$	$\Updownarrow$	<code>\Updownarrow</code>
$[$	$]$	$[$	$($	$($	<code>\lgroup</code>	$\Updownarrow$	$\Updownarrow$	<code>\Updownarrow</code>
$]$	$]$	$]$	$\}$	$\}$	<code>\lmoustache</code>	$\Updownarrow$	$\Updownarrow$	<code>\updownarrow</code>
$($	$($	$($	$($	$($	<code>\lParen</code>	$\Upuparrow$	$\Upuparrow$	<code>\Uparrow</code>
$)$	$)$	$)$	$\rangle$	$\rangle$	<code>\rAngle</code>	$\Upuparrow$	$\Upuparrow$	<code>\UUparrow</code>
$/$	$/$	$/$	$\rangle$	$\rangle$	<code>\rangle</code>	$\parallel$	$\parallel$	<code>\Vert</code>
$\langle$	$\langle$	$<$	$\}$	$\}$	<code>\rbrace</code>	$ $	$ $	<code>\vert</code>
$\rangle$	$\rangle$	$>$	$\}$	$\}$	<code>\rBrace</code>	$\ \ $	$\ \ $	<code>\Vvert</code>
$ $	$ $	$ $	$\ $	$\ $	<code>\rBrack</code>			
$\langle$	$\langle$	$\langle$	$\rangle$	$\rangle$	<code>\rbrrbrak</code>			

TABLE 252: `mathdesign` Variable-sized Delimiters

$\langle$	$\rangle$	<code>\leftwave</code>	$\langle$	$\rangle$	<code>\rightwave</code>
$,$	$,$	<code>\leftevaw</code>	$,$	$,$	<code>\rightevaw</code>

The definitions of these symbols include a preceding `\left` or `\right`. It is therefore an error to specify `\left` or `\right` explicitly. The internal, “primitive” versions of these symbols are called `\lwave`, `\rwave`, `\levaw`, and `\revaw`.

TABLE 253: **nat** Variable-sized Delimiters (Double)

$\langle \langle \backslash lAngle \rangle \rangle$	$\backslash rAngle$
$\llbracket \llbracket \backslash lBrack \rrbracket \rrbracket$	$\backslash rBrack$
$\lceil \lceil \backslash lCeil \rceil \rceil$	$\backslash rCeil$
$\lfloor \lfloor \backslash lFloor \rfloor \rfloor$	$\backslash rFloor$
$\parallel \parallel \backslash lVert^*$	$\parallel \parallel \backslash rVert^*$

\* **nat** redefines all of the above to include implicit  $\backslash left$  and  $\backslash right$  commands. Hence, separate  $\backslash lVert$  and  $\backslash rVert$  commands are needed to disambiguate whether “|” is a left or right delimiter.

All of the symbols in Table 253 can also be expressed using the  $\backslash double$  macro. See the **nat** documentation for examples and additional information.

TABLE 254: **nat** Variable-sized Delimiters (Triple)

$\langle\langle\langle \backslash triple< \rangle\rangle\rangle$	$\backslash triple>$
$\llbracket \llbracket \llbracket \backslash triple[ \rrbracket \rrbracket \rrbracket$	$\backslash triple]$
$\parallel \parallel \parallel \backslash ltriple ^*$	$\parallel \parallel \parallel \backslash rtriple ^*$

\* Similar to  $\backslash lVert$  and  $\backslash rVert$  in Table 253,  $\backslash ltriple$  and  $\backslash rtriple$  must be used instead of  $\backslash triple$  to disambiguate whether “|” is a left or right delimiter.

Note that  $\backslash triple$ —and the corresponding  $\backslash double$ —is actually a macro that takes a delimiter as an argument.

TABLE 255: **fourier** Variable-sized Delimiters

$\llbracket \llbracket \llbracket \backslash llbracket \rrbracket \rrbracket \rrbracket$	$\backslash rrbracket$
$\parallel \parallel \parallel \backslash VERT$	

TABLE 256: logix Variable-sized Delimiters

		\BndBar
(	{	\OpenAngl
)	}	\ClsAngl
{	{	\OpenAnglBar
}	}	\ClsAnglBar
{	{	\OpenArrwBrac
}	}	\ClsArrwBrac
		\OpenBar
		\ClsBar
{	{	\OpenBrac
}	}	\ClsBrac
{	{	\OpenBracBar
}	}	\ClsBracBar
{	{	\OpenBrknBrac
}	}	\ClsBrknBrac
{	{	\OpenBrknBracBar
}	}	\ClsBrknBracBar
{	{	\OpenBrknBrkt
}	}	\ClsBrknBrkt
{	{	\OpenBrknBrktBar
}	}	\ClsBrknBrktBar
[	[	\OpenBrkt
]	]	\ClsBrkt
[[	]]	\OpenBrktBar
]]	]]	\ClsBrktBar
[	[	\OpenCeil
]	]	\ClsCeil
{	{	\OpenCircBrac
}	}	\ClsCircBrac
{	{	\OpenCircBracBar
}	}	\ClsCircBracBar
{	{	\OpenCircBrkt
}	}	\ClsCircBrkt
{	{	\OpenCircBrktBar
}	}	\ClsCircBrktBar
{	{	\OpenCrlyBrkt
}	}	\ClsCrlyBrkt
{	{	\OpenCrlyBrktBar
}	}	\ClsCrlyBrktBar
<	<	\OpenCurvAngl
>	>	\ClsCurvAngl
<<	>>	\OpenDblAngl
>>	<<	\ClsDblAngl
		\OpenDblBar
		\ClsDblBar

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{ { \OpenDblBrac	}	\ClsDblBrac
{} {} \OpenDblCeil	{} {}	\ClsDblCeil
{} {} \OpenDblFloor	{} {}	\ClsDblFloor
{} {} \OpenDblGrp	{} {}	\ClsDblGrp
{} {} \OpenDblParn	{} {}	\ClsDblParn
{} {} \OpenFloor	{} {}	\ClsFloor
{ { \OpenGrp	{ { }	\ClsGrp
{ { \OpenParn	{ { }	\ClsParn
{ { \OpenParnBar	{ { }	\ClsParnBar
{} {} \OpenSqrParn	{} {}	\ClsSqrParn
{ { \OpenTortoise	{ { }	\ClsTortoise
{ { \OpenTortoiseBar	{ { }	\ClsTortoiseBar
{} {} \OpenTrpBar	{} {}	\ClsTrpBar
{} {} \OpenTurn	{} {}	\ClsTurn

logix requires either  $\text{\LaTeX}$  or  $\text{\XeLaTeX}$ .

TABLE 257: *textcomp* Text-mode Delimiters

< \textlangle	> \textrangle
{} {} \textlbrackdbl	{} {} \textrbrackdbl
{ \textlquill	} \textrquill

TABLE 258: *metre* Text-mode Delimiters

{} \alad	{ \Alad	† \crux	† \Crux
{ \alas	{ \Alas	] \quadrad	] \Quadrad
> \angud	> \Angud	[ \quadras	[ \Quadas
< \angus	< \Angus		

TABLE 259: Math-mode Accents

$\acute{a}$	<code>\acute{a}</code>	$\check{a}$	<code>\check{a}</code>	$\grave{a}$	<code>\grave{a}</code>	$\tilde{a}$	<code>\tilde{a}</code>
$\bar{a}$	<code>\bar{a}</code> *	$\ddot{a}$	<code>\ddot{a}</code>	$\hat{a}$	<code>\hat{a}</code>	$\vec{a}$	<code>\vec{a}</code>
$\breve{a}$	<code>\breve{a}</code>	$\dot{a}$	<code>\dot{a}</code>	$\mathring{a}$	<code>\mathring{a}</code>		

Note also the existence of `\imath` and `\jmath`, which produce dotless versions of “*i*” and “*j*”. (See Table 334 on page 157.) These are useful when the accent is supposed to replace the dot. For example, “`\hat{\imath}`” produces a correct “ $\hat{i}$ ”, while “`\hat{i}`” would yield the rather odd-looking “ $\hat{\hat{i}}$ ”.

\* The `\overline` command (Table 270 on page 139) produces a wider accent than `\bar`: “ $\bar{A}$ ” vs. “ $\bar{\bar{A}}$ ”. However, unlike adjacent `\bars`, adjacent `\overlines` run together, which is often not desired: “ $\bar{A}\bar{B}$ ” vs. “ $\bar{\bar{A}}\bar{\bar{B}}$ ”. If wider bars than `\bar` are needed, the following code from Enrico Gregorio can be used to add the requisite inter-symbol spacing [Gre09]:

```
\newcommand{\closure}[2][3]{%
  \mkern#1mu\overline{\mkern-#1mu#2}}
```

With that definition, “`\closure{A}\closure{B}`” produces “ $\bar{A}\bar{B}$ ”, with a visible gap between the two accents. The optional argument can be used to fine-tune the spacing.

TABLE 260: *AMS* Math-mode Accents

$\ddot{a}$	<code>\ddot{a}</code>	$\ddot{\ddot{a}}$	<code>\ddot{\ddot{a}}</code>
------------	-----------------------	-------------------	------------------------------

These accents are also provided by the `mathabx` and `accents` packages and are redefined by the `mathdots` package if the `amsmath` and `amssymb` packages have previously been loaded. All of the variations except for the original *AMS* ones tighten the space between the dots (from  $\ddot{a}$  to  $\ddot{\ddot{a}}$ ). The `mathabx` and `mathdots` versions also function properly within subscripts and superscripts ( $x^{\ddot{a}}$  instead of  $x^{\ddot{\ddot{a}}}$ ).

TABLE 261: MnSymbol Math-mode Accents

$\vec{a}$	<code>\vec{a}</code>
-----------	----------------------

TABLE 262: *fdsymbol* Math-mode Accents

$\mathfrak{a}$	<code>\middlebar{a}</code>	$\mathfrak{a}$	<code>\strokethrough{a}</code>
$\mathfrak{a}$	<code>\middleslash{a}</code>	$\mathfrak{a}$	<code>\vec{a}</code>

`\middlebar` and `\middleslash` are applied here to “ $a$ ” for consistency with the rest of the document, but they generally look better when applied to taller lowercase characters.

TABLE 263: *boisik* Math-mode Accents

$\mathfrak{a}$	<code>\vec{a}</code>
----------------	----------------------

TABLE 264: *stix* Math-mode Accents

$\acute{a}$	<code>\acute{a}</code>	$\hat{a}$	<code>\hat{a}</code>
$\overline{a}$	<code>\annuity{a}</code>	$\overleftarrow{a}$	<code>\leftarrowarrowaccent{a}</code>
$\ddot{a}$	<code>\asteraccent{a}</code>	$\overleftarrow{\overleftarrow{a}}$	<code>\leftharpoonaccent{a}</code>
$\bar{a}$	<code>\bar{a}</code>	$\overleftarrow{\overrightarrow{a}}$	<code>\leftrightarrowaccent{a}</code>
$\breve{a}$	<code>\breve{a}</code>	$\mathring{a}$	<code>\mathring{a}</code>
$\candra{a}$	<code>\candra{a}</code>	$\circcommatopright{a}$	<code>\circcommatopright{a}</code>
$\check{a}$	<code>\check{a}</code>	$\circturnedcomma{a}$	<code>\circturnedcomma{a}</code>
$\dddot{a}$	<code>\dddot{a}</code>	$\circvhook{a}$	<code>\circvhook{a}</code>
$\ddot{a}$	<code>\ddot{a}</code>	$\overrightarrow{\overleftarrow{a}}$	<code>\rightharpoonaccent{a}</code>
$\ddot{a}$	<code>\ddot{a}</code>	$\tilde{a}$	<code>\tilde{a}</code>
$\dot{a}$	<code>\dot{a}</code>	$\vec{a}$	<code>\vec{a}</code>
$\droang{a}$	<code>\droang{a}</code>	$\widebridgeabove{a}$	<code>\widebridgeabove{a}</code>
$\grave{a}$	<code>\grave{a}</code>		

TABLE 265: *fge* Math-mode Accents

$\mathring{A}\mathring{a}$	<code>\spiritusasper{A}\spiritusasper{a}</code>
$\mathring{A}\mathring{a}$	<code>\spirituslenis{A}\spirituslenis{a}</code>

When *fge* is passed the *crescent* option, these symbols instead uses a crescent accent as in “ $\mathring{a}$ ” and “ $\mathring{a}$ ”.

TABLE 266: *yhmath* Math-mode Accents

$\mathring{a}$	<code>\ring{a}</code>
----------------	-----------------------

This symbol is largely obsolete, as standard L<sup>A</sup>T<sub>E</sub>X 2<sub>&</sub> has supported `\mathring{a}` (Table 259) since June 1998 [L<sup>A</sup>T<sub>E</sub>98].

TABLE 267: pdfMsym Math-mode Accents

$\hat{a}$	<code>\shortlvecc{a}</code>	$\underline{a}$	<code>\shortunderleftrightharp{a}</code>
$\bar{a}$	<code>\shortoverleftharp{a}</code>	$\underline{\bar{a}}$	<code>\shortunderleftrightvecc{a}</code>
$\tilde{a}$	<code>\shortoverleftrightharp{a}</code>	$\underline{\tilde{a}}$	<code>\shortunderlvecc{a}</code>
$\ddot{a}$	<code>\shortoverleftrightharp{a}</code>	$\underline{\ddot{a}}$	<code>\shortunderrightharp{a}</code>
$\vec{a}$	<code>\shortoverrightharp{a}</code>	$\underline{\vec{a}}$	<code>\shortunderrightleftharp{a}</code>
$\dot{a}$	<code>\shortoverrightleftharp{a}</code>	$\underline{\dot{a}}$	<code>\shortunderstraightlvecc{a}</code>
$\overline{a}$	<code>\shortstraightlvecc{a}</code>	$\underline{\overline{a}}$	<code>\shortunderstraightvecc{a}</code>
$\overrightarrow{a}$	<code>\shortstraightvecc{a}</code>	$\underline{\overrightarrow{a}}$	<code>\shortundervecc{a}</code>
$\overleftarrow{a}$	<code>\shortunderleftharp{a}</code>	$\overleftarrow{\underline{a}}$	<code>\shortvecc{a}</code>

pdfMsym symbols are implemented with PDF literals instead of (or sometimes in conjunction) with a font. All symbols can be rendered by pdfL<sup>A</sup>T<sub>E</sub>X and L<sup>a</sup>u<sub>L</sub>AT<sub>E</sub>X, some by X<sub>E</sub>L<sup>A</sup>T<sub>E</sub>X, and none by most other T<sub>E</sub>X backends.

TABLE 268: halloweenmath Halloween-Themed Math-mode Accents

$\overline{\hat{a}}$	<code>\overbat{a}</code>	$\underline{a}$	<code>\underbat{a}</code>
$\overline{\overline{\hat{a}}}$	<code>\overbat*{a}</code>	$\underline{\underline{a}}$	<code>\underbat*{a}</code>

TABLE 269: realhats Math-mode Hat Accents

	<code>\hat[ash]{a}</code>		<code>\hat[santa]{a}</code>
	<code>\hat[beret]{a}</code>		<code>\hat[scottish]{a}</code>
	<code>\hat[birthday]{a}</code>		<code>\hat[sombrero]{a}</code>
	<code>\hat[cowboy]{a}</code>		<code>\hat[tile-blue]{a}</code>
	<code>\hat[crown]{a}</code>		<code>\hat[tile-gray]{a}</code>
	<code>\hat[dunce]{a}</code>		<code>\hat[tile-light-blue]{a}</code>
	<code>\hat[fez]{a}</code>		<code>\hat[tile-white]{a}</code>
	<code>\hat[mortarboard]{a}</code>		<code>\hat[tophat]{a}</code>
	<code>\hat[policeman]{a}</code>		<code>\hat[witch]{a}</code>

These hats are drawn by scaling a graphic image and placing it at an appropriate location.

If `\hat` is used with no argument, it selects a hat at random. Alternatively, a hat type can be passed as an option to `realhats` to specify the default hat. See the `realhats` documentation for more information.

TABLE 270: Extensible Accents

$\widetilde{abc}$	<code>\widetilde{abc}</code> *	$\widehat{abc}$	<code>\widehat{abc}</code> *
$\overleftarrow{abc}$	<code>\overleftarrow{abc}</code> †	$\overrightarrow{abc}$	<code>\overrightarrow{abc}</code> †
$\overline{abc}$	<code>\overline{abc}</code>	$\underline{abc}$	<code>\underline{abc}</code>
$\overbrace{abc}$	<code>\overbrace{abc}</code>	$\underbrace{abc}$	<code>\underbrace{abc}</code>
$\sqrt{abc}$		<code>\sqrt{abc}</code> ‡	

As demonstrated in a 1997 TUGboat article about typesetting long-division problems [Gib97], an extensible long-division sign (“ $\overline{abc}$ ”) can be faked by putting a “`\big`” in a `tabular` environment with an `\hline` or `\cline` in the preceding row. The article also presents a piece of code (uploaded to CTAN as `longdiv.tex`) that automatically solves and typesets—by putting an `\overline` atop “`\big`” and the desired text—long-division problems. More recently, the STIX fonts include a true long-division sign. See `\longdivision` in Table 276 for a sample of this symbol. See also the `polynom` package, which automatically solves and typesets polynomial-division problems in a similar manner.

\* These symbols are made more extensible by the `MnSymbol` package (Table 274 on page 140). and even more extensible by the `yhmath` package (Table 272).

† If you’re looking for an extensible *diagonal* line or arrow to be used for canceling or reducing mathematical subexpressions (e.g., “ $\cancel{x+x}$ ” or “ $\cancel{3+2^5}$ ”) then consider using the `cancel` package.

‡ With an optional argument, `\sqrt` typesets nth roots. For example, “`\sqrt[3]{abc}`” produces “ $\sqrt[3]{abc}$ ” and “`\sqrt[n]{abc}`” produces “ $\sqrt[n]{abc}$ ”.

TABLE 271: `overrightarrow` Extensible Accents

$$\overrightarrow{abc} \quad \text{\code{\overrightarrow{abc}}}$$

TABLE 272: `yhmath` Extensible Accents

$\widehat{abc}$	<code>\widehat{abc}</code>	$\widetilde{abc}$	<code>\widetilde{abc}</code>
$\wideparen{abc}$	<code>\wideparen{abc}</code>	$\widehat{abc}$	<code>\widehat{abc}</code>
$\overset{\circ}{abc}$	<code>\overset{\circ}{abc}</code>	$\widehat{abc}$	<code>\widehat{abc}</code>

TABLE 273: *AMS* Extensible Accents

$\overleftarrow{\overrightarrow{abc}}$	<code>\overleftrightarrow{abc}</code>	$\overleftarrow{\underleftarrow{abc}}$	<code>\underleftrightarrow{abc}</code>
$\overleftarrow{\underleftarrow{abc}}$	<code>\underleftarrow{abc}</code>	$\overleftarrow{\underrightarrow{abc}}$	<code>\underrightarrow{abc}</code>

TABLE 274: MnSymbol Extensible Accents

$\overbrace{\overbrace{abc}}$	<code>\overbrace{abc}</code>	$\underbrace{\underbrace{abc}}$	<code>\underbrace{abc}</code>
$\overbrace{\overbrace{abc}}$	<code>\overgroup{abc}</code>	$\underbrace{\underbrace{abc}}$	<code>\underlinesegment{abc}</code>
$\overbrace{\overbrace{abc}}$	<code>\overleftharpoon{abc}</code>	$\widehat{\overbrace{abc}}$	<code>\widehat{abc}</code>
$\overbrace{\overbrace{abc}}$	<code>\overlinesegment{abc}</code>	$\widehat{\overbrace{abc}}$	<code>\wideparen{abc}</code>
$\overbrace{\overbrace{abc}}$	<code>\overrightharpoon{abc}</code>	$\widetilde{\overbrace{abc}}$	<code>\widetilde{abc}</code>
$\overbrace{\overbrace{abc}}$	<code>\underbrace{abc}</code>		

TABLE 275: fdsymbol Extensible Accents

$\overbrace{\overbrace{abc}}$	<code>\overbrace{abc}</code>	$\underbrace{\underbrace{abc}}$	<code>\underbrace{abc}</code>
$\overbrace{\overbrace{abc}}$	<code>\overgroup{abc}</code>	$\underbrace{\underbrace{abc}}$	<code>\underlinesegment{abc}</code>
$\overbrace{\overbrace{abc}}$	<code>\overleftharpoon{abc}</code>	$\widehat{\overbrace{abc}}$	<code>\widehat{abc}</code>
$\overbrace{\overbrace{abc}}$	<code>\overlinesegment{abc}</code>	$\widehat{\overbrace{abc}}$	<code>\wideparen{abc}</code>
$\overbrace{\overbrace{abc}}$	<code>\overrightharpoon{abc}</code>	$\widetilde{\overbrace{abc}}$	<code>\widetilde{abc}</code>
$\overbrace{\overbrace{abc}}$	<code>\underbrace{abc}</code>		

TABLE 276: stix Extensible Accents

$\overbrace{abc}$	<code>\longdivision{abc}</code>	$\underbrace{abc}$	<code>\underbracket{abc}</code>
$\overbrace{abc}$	<code>\overbrace{abc}</code>	$\underbrace{abc}$	<code>\underleftarrow{abc}</code>
$\overbracket{abc}$	<code>\overbracket{abc}</code>	$\underbrace{abc}$	<code>\underleftharpoon{abc}</code>
$\overleftarrow{abc}$	<code>\overleftarrow{abc}</code>	$\underbrace{abc}$	<code>\underleftrightarrow{abc}</code>
$\overleftarrow{abc}$	<code>\overleftharpoon{abc}</code>	$\underbrace{abc}$	<code>\underparen{abc}</code>
$\overrightarrow{abc}$	<code>\overleftrightarrow{abc}</code>	$\underbrace{abc}$	<code>\underrightarrow{abc}</code>
$\overbrace{abc}$	<code>\overparen{abc}</code>	$\underbrace{abc}$	<code>\underrightharpoon{abc}</code>
$\overrightarrow{abc}$	<code>\overrightarrow{abc}</code>	$\widecheck{abc}$	<code>\widecheck{abc}</code>
$\overrightarrow{abc}$	<code>\overrightharpoon{abc}</code>	$\widehat{abc}$	<code>\widehat{abc}</code>
$\sqrt{abc}$	<code>\sqrt{abc}</code>	$\widetilde{abc}$	<code>\widetilde{abc}</code>
$\underbrace{abc}$	<code>\underbrace{abc}</code>		

TABLE 277: mathtools Extensible Accents

$\overbrace{abc}$	<code>\overbrace{abc}</code>	$\underbrace{abc}$	<code>\underbrace{abc}</code>
$\overbracket{abc}$	<code>\overbracket{abc}</code> *	$\underbrace{abc}$	<code>\underbracket{abc}</code> *

\* `\overbracket` and `\underbracket` accept optional arguments that specify the bracket height and thickness. See the `mathtools` documentation for more information.

TABLE 278: mathabx Extensible Accents

$\overbrace{abc}$	<code>\overbrace{abc}</code>	$\overline{abc}$	<code>\widebar{abc}</code>
$\overbrace{abc}$	<code>\overgroup{abc}</code>	$\widecheck{abc}$	<code>\widecheck{abc}</code>
$\underbrace{abc}$	<code>\underbrace{abc}</code>	$\widehat{abc}$	<code>\wideparen{abc}</code>
$\underbrace{abc}$	<code>\undergroup{abc}</code>	$\widecheck{\overset{\circ}{abc}}$	<code>\widering{abc}</code>
$\overrightarrow{abc}$	<code>\widearrow{abc}</code>		

The braces shown for `\overbrace` and `\underbrace` appear in their minimum size. They can expand arbitrarily wide, however.

TABLE 279: fourier Extensible Accents

$\widehat{abc}$	<code>\widearc{abc}</code>	$\widehat{abc}$	<code>\wideparen{abc}</code>
$\overbrace{abc}$	<code>\wideOarc{abc}</code>	$\overset{\circ}{abc}$	<code>\widering{abc}</code>

TABLE 280: esvect Extensible Accents

$\overrightarrow{abc}$	<code>\vv{abc}</code> with package option a
$\overrightarrow{abc}$	<code>\vv{abc}</code> with package option b
$\overrightarrow{abc}$	<code>\vv{abc}</code> with package option c
$\overrightarrow{abc}$	<code>\vv{abc}</code> with package option d
$\overrightarrow{abc}$	<code>\vv{abc}</code> with package option e
$\overrightarrow{abc}$	<code>\vv{abc}</code> with package option f
$\overrightarrow{abc}$	<code>\vv{abc}</code> with package option g
$\overrightarrow{abc}$	<code>\vv{abc}</code> with package option h

`esvect` also defines a `\vv*` macro which is used to typeset arrows over vector variables with subscripts. See the `esvect` documentation for more information.

TABLE 281: pdfMsym Extensible Accents

$\overleftarrow{abc}$	<code>\lvecc{abc}*{}</code>	$\underline{abc}$	<code>\underlvecc{abc}</code>
$\overleftarrow{\overleftarrow{abc}}$	<code>\overleftharp{abc}*{}</code>	$\underline{\underline{abc}}$	<code>\underrightharp{abc}</code>
$\overleftarrow{\overrightarrow{abc}}$	<code>\overleftrightharp{abc}*{}</code>	$\underline{\overleftarrow{abc}}$	<code>\underrightleftharp{abc}</code>
$\overleftrightarrow{abc}$	<code>\overleftrightvecc{abc}*{}</code>	$\underline{\overleftarrow{abc}}$	<code>\understraightlvecc{abc}</code>
$\overrightarrow{abc}$	<code>\overrightharp{abc}*{}</code>	$\underline{\overrightarrow{abc}}$	<code>\understraightvecc{abc}</code>
$\overrightarrow{\overleftarrow{abc}}$	<code>\overrightleftharp{abc}*{}</code>	$\underline{\overrightarrow{abc}}$	<code>\undervecc{abc}</code>
$\overleftarrow{\overleftarrow{\overleftarrow{abc}}}$	<code>\straightlvecc{abc}*{}</code>	$\widetilde{\overleftarrow{abc}}$	<code>\varwidecheck{abc}</code>
$\overrightarrow{\overrightarrow{\overrightarrow{abc}}}$	<code>\straightvecc{abc}*{}</code>	$\widetilde{\overrightarrow{abc}}$	<code>\varwidehat{abc}</code>
$\underline{abc}$	<code>\underleftharp{abc}</code>	$\widetilde{\underline{abc}}$	<code>\varwidetilde{abc}</code>
$\underline{\underline{abc}}$	<code>\underleftrightharp{abc}</code>	$\overrightarrow{\overrightarrow{abc}}$	<code>\vecc{abc}*{}</code>
$\underline{\overleftarrow{abc}}$	<code>\underleftrightvecc{abc}</code>		

pdfMsym symbols are implemented with PDF literals instead of (or sometimes in conjunction) with a font. All symbols can be rendered by pdfL<sup>A</sup>T<sub>E</sub>X and LuaL<sup>A</sup>T<sub>E</sub>X, some by X<sub>H</sub>L<sup>A</sup>T<sub>E</sub>X, and none by most other T<sub>E</sub>X backends.

\* The `\constvec` command takes one of these vector commands and its argument and typesets the accent at  $x$  height, truncating everything above it. Hence, while `\overleftharp{abcMxyz}` produces “ $\overleftarrow{abc}Mxyz$ ”, `\constvec{\overleftharp}{abcMxyz}` produces “ $\overleftarrow{abc}Mxyz$ ”.

TABLE 282: overarrows Extensible Accents

$\overline{abc}$	<code>\overbar{abc}</code>	$\underline{abc}$	<code>\underbar{abc}</code>
$\overleftarrow{abc}$	<code>\overleftarrow{abc}</code>	$\underleftarrow{abc}$	<code>\underleftarrow{abc}</code>
$\overleftarrow{\overleftarrow{abc}}$	<code>\overleftarrow{\overleftarrow{abc}}</code>	$\underleftarrow{\underleftarrow{abc}}$	<code>\underleftarrow{\underleftarrow{abc}}</code>
$\overleftarrow{\overleftarrow{\overleftarrow{abc}}}$	<code>\overleftarrow{\overleftarrow{\overleftarrow{abc}}}</code>	$\underleftarrow{\underleftarrow{\underleftarrow{abc}}}$	<code>\underleftarrow{\underleftarrow{\underleftarrow{abc}}}</code>
$\overleftarrow{\overleftarrow{\overleftarrow{\overleftarrow{abc}}}}$	<code>\overleftarrow{\overleftarrow{\overleftarrow{\overleftarrow{abc}}}}</code>	$\underleftarrow{\underleftarrow{\underleftarrow{\underleftarrow{abc}}}}$	<code>\underleftarrow{\underleftarrow{\underleftarrow{\underleftarrow{abc}}}}</code>
$\overrightarrow{abc}$	<code>\overrightarrow{abc}</code>	$\underrightarrow{abc}$	<code>\underrightarrow{abc}</code>
$\overrightarrow{\overrightarrow{abc}}$	<code>\overrightarrow{\overrightarrow{abc}}</code>	$\underrightarrow{\underrightarrow{abc}}$	<code>\underrightarrow{\underrightarrow{abc}}</code>
$\overrightarrow{\overrightarrow{\overrightarrow{abc}}}$	<code>\overrightarrow{\overrightarrow{\overrightarrow{abc}}}</code>	$\underrightarrow{\underrightarrow{\underrightarrow{abc}}}$	<code>\underrightarrow{\underrightarrow{\underrightarrow{abc}}}</code>
$\overrightarrow{\overrightarrow{\overrightarrow{\overrightarrow{abc}}}}$	<code>\overrightarrow{\overrightarrow{\overrightarrow{\overrightarrow{abc}}}}</code>	$\underrightarrow{\underrightarrow{\underrightarrow{\underrightarrow{abc}}}}$	<code>\underrightarrow{\underrightarrow{\underrightarrow{\underrightarrow{abc}}}}</code>

`overarrows` is extremely customizable. Virtually all aspects of arrows—length, thickness, position, scale, arrowhead style, etc.—can be modified, and new extensible arrows can be constructed. See the `overarrows` documentation for more information. For example, the documentation shows how to create extensible arrows like the following:

$$\overbrace{abc}^{\curvearrowleft\curvearrowright} \quad \text{\textbackslash overarchedleftrightarrow\{abc\}} \quad \overbrace{abc}^{\curvearrowleft\curvearrowright} \quad \text{\textbackslash overbandedarrow\{abc\}}$$

TABLE 283: abraces Extensible Accents

$$\overbrace{abc}^{\curvearrowleft\curvearrowright} \quad \text{\textbackslash aoverbrace\{abc\}} \quad \underbrace{abc}_{\curvearrowleft\curvearrowright} \quad \text{\textbackslash aunderbrace\{abc\}}$$

`\aoverbrace` and `\aunderbrace` accept optional arguments that provide a great deal of control over the braces' appearance. For example, these commands can produce braces with asymmetric endpoints, braces that span lines, dashed braces, and multicolored braces. See the `abraces` documentation for more information.

TABLE 284: undertilde Extensible Accents

$$\underline{abc} \quad \text{\textbackslash utilde\{abc\}}$$

Because `\utilde` is based on `\widetilde` it is also made more extensible by the `yhmath` package (Table 272).

TABLE 285: `ushort` Extensible Accents

$$\underline{\underline{abc}} \quad \backslash ushortdw\{abc\} \quad \underline{abc} \quad \backslash ushortw\{abc\}$$

`\ushortw` and `\ushortdw` are intended to be used with multi-character arguments (“words”) while `\ushort` and `\ushortd` are intended to be used with single-character arguments.

The underlines produced by the `ushort` commands are shorter than those produced by the `\underline` command. Consider the output from the expression “`\ushort{x}\ ushort{y}\underline{x}\underline{y}`”, which looks like “xyy”.

TABLE 286: `mdwmath` Extensible Accents

$$\sqrt{abc} \quad \backslash sqrt*\{abc\}$$

TABLE 287: `actuarialangle` Extensible Accents

$$\overline{abc} \quad \backslash actuarialangle\{abc\}$$

The `actuarialangle` package additionally defines `\angl` as `\actuarialangle` with a small amount of extra space to the right of the accented expression under the `\`, `\angln` as `\angl{n}`, and `\anglr` as `\angl{r}`.

TABLE 288: `AMS` Extensible Arrows

$$\xleftarrow{abc} \quad \backslash xleftarrow\{abc\} \quad \xrightarrow{abc} \quad \backslash xrightarrow\{abc\}$$

TABLE 289: `mathtools` Extensible Arrows

$\xleftarrow{abc}$	<code>\xhookleftarrow{abc}</code>	$\xrightarrow{abc}$	<code>\xleftrightharpoons{abc}</code>
$\xrightarrow{abc}$	<code>\xhookrightarrow{abc}</code>	$\xrightarrow{abc}$	<code>\xmapsto{abc}</code>
$\xleftarrow{abc}$	<code>\xLeftarrow{abc}</code>	$\xrightarrow{abc}$	<code>\xRightarrow{abc}</code>
$\xleftarrow{abc}$	<code>\xleftharpoondown{abc}</code>	$\xrightarrow{abc}$	<code>\xightharpoondown{abc}</code>
$\xleftarrow{abc}$	<code>\xleftharpoonup{abc}</code>	$\xrightarrow{abc}$	<code>\xightharpoonup{abc}</code>
$\xleftrightarrow{abc}$	<code>\xleftrightarrow{abc}</code>	$\xleftrightarrow{abc}$	<code>\xrightleftharpoons{abc}</code>
$\xleftrightarrow{abc}$	<code>\xLeftrightarrow{abc}</code>		

TABLE 290: `chemarr` Extensible Arrows

$$\xrightleftharpoons[abc]{abc} \quad \text{\textbackslash xrightleftharpoons\{abc\}}$$

TABLE 291: `chemarrow` Extensible Arrows

$\xleftarrow[def]{abc}$	<code>\autoleftarrow{abc}{def}</code>	$\xrightarrow[def]{abc}$	<code>\autorightarrow{abc}{def}</code>
$\xrightleftharpoons[def]{abc}$	<code>\autoleftrightharpoons{abc}{def}</code>	$\xrightleftharpoons[def]{abc}$	<code>\autorightleftharpoons{abc}{def}</code>

In addition to the symbols shown above, `chemarrow` also provides `\larrowfill`, `\rarrowfill`, `\leftrightharpoonsfill`, and `\rightleftharpoonsfill` macros. Each of these takes a length argument and produces an arrow of the specified length.

TABLE 292: `extarrows` Extensible Arrows

$\xrightleftharpoons[abc]{abc}$	<code>\xLeftrightarrow{abc}</code>	$\xrightleftharpoons[abc]{abc}$	<code>\xLongleftrightarrow{abc}</code>
$\xrightleftharpoons[abc]{abc}$	<code>\xleftrightarrows{abc}</code>	$\xrightleftharpoons[abc]{abc}$	<code>\xlongleftrightarrows{abc}</code>
$\xrightleftharpoons[abc]{abc}$	<code>\xlongequal{abc}</code>	$\xrightleftharpoons[abc]{abc}$	<code>\xLongrightarrows{abc}</code>
$\xrightleftharpoons[abc]{abc}$	<code>\xLongleftarrow{abc}</code>	$\xrightleftharpoons[abc]{abc}$	<code>\xlongrightarrows{abc}</code>
$\xrightleftharpoons[abc]{abc}$	<code>\xlongleftarrow{abc}</code>		

TABLE 293: pdfMsym Extensible Arrows

$\xleftarrow[abc]$	<code>\xvarCircleleftarrow{abc}</code>	$\xrightleftarrows[abc]$	<code>\xvarLleftRrightarrow{abc}</code>
$\xleftarrow[abc]$	<code>\xvarcircleleftarrow{abc}</code>	$\xleftarrow[abc]$	<code>\xvarmapsfrom{abc}</code>
$\xrightarrow[abc]$	<code>\xvarCirclerightarrow{abc}</code>	$\xrightarrow[abc]$	<code>\xvarmapsto{abc}</code>
$\xrightarrow[abc]$	<code>\xvarcirclerightarrow{abc}</code>	$\xleftarrow[abc]$	<code>\xvarRibbonleftarrow{abc}</code>
$\xleftarrow[abc]$	<code>\xvardoubleleftarrow{abc}</code>	$\xrightarrow[abc]$	<code>\xvarRibbonrightarrow{abc}</code>
$\xrightarrow[abc]$	<code>\xvardoublerightarrow{abc}</code>	$\xrightarrow[abc]$	<code>\xvarRightarrow{abc}</code>
$\xleftarrow[abc]$	<code>\xvardownhookleftarrow{abc}</code>	$\xrightarrow[abc]$	<code>\xvarrightarrow{abc}</code>
$\xrightarrow[abc]$	<code>\xvardownhookrightarrow{abc}</code>	$\xrightarrow[abc]$	<code>\xvarrightarrows{abc}</code>
$\xleftarrow[abc]$	<code>\xvarleftarrow{abc}</code>	$\xrightarrow[abc]$	<code>\xvarrightleftarrows{abc}</code>
$\xleftarrow[abc]$	<code>\xvarLeftarrow{abc}</code>	$\xrightarrow[abc]$	<code>\xvarRightarrow{abc}</code>
$\xleftarrow[abc]$	<code>\xvarleftarrows{abc}</code>	$\xrightarrow[abc]$	<code>\xvarSquareleftarrow{abc}</code>
$\xrightarrow[abc]$	<code>\xvarleftrightarrow{abc}</code>	$\xrightarrow[abc]$	<code>\xvarSquarerightarrow{abc}</code>
$\xleftarrow[abc]$	<code>\xvarleftrightarrows{abc}</code>	$\xrightarrow[abc]$	<code>\xvaruphookleftarrow{abc}</code>
$\xleftarrow[abc]$	<code>\xvarLleftarrow{abc}</code>	$\xrightarrow[abc]$	<code>\xvaruphookrightarrow{abc}</code>

`pdfMsym` symbols are implemented with PDF literals instead of (or sometimes in conjunction) with a font. All symbols can be rendered by `pdfLATEX` and `LuaLATEX`, some by `XELATEX`, and none by most other `TEX` backends.

TABLE 294: extpfeil Extensible Arrows

$\xlongequal[abc]$	<code>\xlongequal{abc}</code>	$\xtwoheadleftarrow[abc]$	<code>\xtwoheadleftarrow{abc}</code>
$\xmapsto[abc]$	<code>\xmapsto{abc}</code>	$\xtwoheadrightarrow[abc]$	<code>\xtwoheadrightarrow{abc}</code>
$\xleftrightarrow[abc]$	<code>\xleftrightarrow{abc}</code>		

The `extpfeil` package also provides a `\newextarrow` command to help you define your own extensible arrow symbols. See the `extpfeil` documentation for more information.

TABLE 295: DotArrow Extensible Arrows

$$\xrightarrow[a]{\dots} \dot{\rightarrow} \text{dotarrow}\{a\}$$

The `DotArrow` package provides mechanisms for lengthening the arrow, adjusting the distance between the arrow and its symbol, and altering the arrowhead. See the `DotArrow` documentation for more information.

TABLE 296: halloweenmath Extensible Arrows

$\overleftarrow{abc}$	<code>\overscriptleftarrow{abc}</code>	$\overleftarrow{abc}$	<code>\underscriptleftarrow{abc}</code>
$\overleftrightarrow{abc}$	<code>\overscriptleftrightarrow{abc}</code>	$\overleftrightarrow{abc}$	<code>\underscriptleftrightarrow{abc}</code>
$\overrightarrow{abc}$	<code>\overscriptrightarrow{abc}</code>	$\overrightarrow{abc}$	<code>\underscriptrightarrow{abc}</code>

These commands always typeset the arrow in script (small) style, hence the “script” in their names. Contrast the size of the arrowheads in the following examples (zoomed 3x for clarity):

$$\begin{array}{ccc} \overrightarrow{\overbrace{abc}} & \text{vs.} & \overrightarrow{\overbrace{abc}} \\ \backslash\overrightarrow{\overbrace{abc}} & & \backslash\overscriptrightarrow{abc} \end{array}$$

TABLE 297: pdfMsym Extensible Harpoons

$\overleftarrow{\overbrace{abc}}$	<code>\xvarleftharp{abc}</code>	$\overrightarrow{\overbrace{abc}}$	<code>\xvarrightharp{abc}</code>
$\overleftarrow{\overbrace{abc}}$	<code>\xvarleftrightharp{abc}</code>	$\overrightarrow{\overbrace{abc}}$	<code>\xvarrightleftharp{abc}</code>

pdfMsym symbols are implemented with PDF literals instead of (or sometimes in conjunction) with a font. All symbols can be rendered by pdfL<sup>A</sup>T<sub>E</sub>X and LuaL<sup>A</sup>T<sub>E</sub>X, some by X<sub>H</sub>L<sup>A</sup>T<sub>E</sub>X, and none by most other T<sub>E</sub>X backends.

TABLE 298: harpoon Extensible Harpoons

$\overleftarrow{\overbrace{abc}}$	<code>\overleftharp{abc}</code>	$\overrightarrow{\overbrace{abc}}$	<code>\overrightharpdown{abc}</code>	$\overbrace{\overleftarrow{abc}}$	<code>\underrightharp{abc}</code>
$\overleftarrow{\overbrace{abc}}$	<code>\overleftharpdown{abc}</code>	$\overbrace{\overleftarrow{abc}}$	<code>\underleftharp{abc}</code>	$\overbrace{\overrightarrow{abc}}$	<code>\underrightharpdown{abc}</code>
$\overleftarrow{\overbrace{abc}}$	<code>\overrightharpdown{abc}</code>	$\overbrace{\overrightarrow{abc}}$	<code>\underleftharpdown{abc}</code>		

All of the harpoon symbols are implemented using the `graphics` package (specifically, `graphics`'s `\resizebox` command). Consequently, only T<sub>E</sub>X backends that support graphical transformations (e.g., *not* Xdvi) can properly display these symbols.

TABLE 299: trfsigns Extensible Transform Symbols

$\overleftarrow{\overbrace{abc}}$	<code>\dft{abc}</code>	$\overrightarrow{\overbrace{abc}}$	<code>\DFT{abc}</code>
-----------------------------------	------------------------	------------------------------------	------------------------

TABLE 300: esrelation Extensible Relations

$\overleftarrow{abc}$	<code>\relationleftproject{abc}</code>	$\overrightarrow{abc}$	<code>\relationrightproject{abc}</code>
$\underline{abc}$	<code>\relationlifting{abc}</code>		

TABLE 301: halloweenmath Extensible Brooms and Pitchforks

$\overleftarrow{\overleftarrow{abc}}$	<code>\overleftbroom{abc}</code>	$\overleftarrow{\overrightarrow{abc}}$	<code>\underrightbroom{abc}</code>
$\overleftarrow{\overleftarrow{\overleftarrow{abc}}}$	<code>\overleftpitchfork{abc}</code>	$\overleftarrow{\overrightarrow{\overleftarrow{abc}}}$	<code>\underrightpitchfork{abc}</code>
$\overrightarrow{\overleftarrow{abc}}$	<code>\overrightbroom{abc}</code>	$\overrightarrow{\overleftarrow{\overrightarrow{abc}}}$	<code>\xleftbroom{abc}</code>
$\overrightarrow{\overleftarrow{\overrightarrow{abc}}}$	<code>\overrightpitchfork{abc}</code>	$\overrightarrow{\overleftarrow{\overleftarrow{abc}}}$	<code>\xleftpitchfork{abc}</code>
$\overleftarrow{\overleftarrow{\overleftarrow{\overleftarrow{abc}}}}$	<code>\underleftbroom{abc}</code>	$\overleftarrow{\overrightarrow{\overrightarrow{\overleftarrow{abc}}}}$	<code>\xrightbroom{abc}</code>
$\overleftarrow{\overleftarrow{\overleftarrow{\overleftarrow{\overleftarrow{abc}}}}}$	<code>\underleftpitchfork{abc}</code>	$\overleftarrow{\overrightarrow{\overrightarrow{\overrightarrow{\overleftarrow{abc}}}}}$	<code>\xrightpitchfork{abc}</code>

TABLE 302: halloweenmath Extensible Witches

	\overleftwitchonbroom{abc}		\underrightwitchonbroom{abc}
	\overleftwitchonbroom*{abc}		\underrightwitchonbroom*{abc}
	\overleftwitchonpitchfork*{abc}		\underrightwitchonpitchfork*{abc}
	\overleftwitchonpitchfork{abc}		\underrightwitchonpitchfork{abc}
	\overrightwitchonbroom*{abc}		\xleftwitchonbroom*{abc}
	\overrightwitchonbroom{abc}		\xleftwitchonbroom{abc}
	\overrightwitchonpitchfork*{abc}		\xleftwitchonpitchfork*{abc}
	\overrightwitchonpitchfork{abc}		\xleftwitchonpitchfork{abc}
	\underleftwitchonbroom{abc}		\xrightwitchonbroom{abc}
	\underleftwitchonbroom*{abc}		\xrightwitchonbroom*{abc}
	\underleftwitchonpitchfork*{abc}		\xrightwitchonpitchfork*{abc}
	\underleftwitchonpitchfork{abc}		\xrightwitchonpitchfork{abc}

TABLE 303: halloweenmath Extensible Ghosts

	\overleftswishingghost{abc}		\overrightswishingghost{abc}
	\underleftswishingghost{abc}		\underrightswishingghost{abc}
	\xleftswishingghost{abc}		\xrightswishingghost{abc}

TABLE 304: halloweenmath Extensible Bats

	\overleftflutteringbat{abc}		\overrightflutteringbat{abc}
	\underleftflutteringbat{abc}		\underrightflutteringbat{abc}
	\xleftflutteringbat{abc}		\xrightflutteringbat{abc}

TABLE 305: *holtpolt* Non-commutative Division Symbols

$\begin{array}{c} abc \\ \hline def \end{array}$	<code>\holter{abc}{def}</code>	$\begin{array}{c} abc \\ \hline def \end{array}$	<code>\polter{abc}{def}</code>
--	--------------------------------	--	--------------------------------

TABLE 306: Dots

.	<code>\cdotp</code>	:	<code>\colon^*</code>	.	<code>\ldotp</code>	:	<code>\vdots</code>
...	<code>\cdots</code>	..	<code>\ddots</code>	...	<code>\ldots</code>		

\* While “:” is valid in math mode, `\colon` uses different surrounding spacing. See Section 12.4 and the Short Math Guide for L<sup>A</sup>T<sub>E</sub>X [Dow00] for more information on math-mode spacing.

<sup>†</sup> The `mathdots` package redefines `\ddots` and `\vdots` (Table 312) to make them scale properly with font size. (They normally scale horizontally but not vertically.) `\fixedddots` and `\fixedvdots` provide the original, fixed-height functionality of L<sup>A</sup>T<sub>E</sub>X 2<sub>ε</sub>'s `\ddots` and `\vdots` macros.

TABLE 307: *AMS* Dots

..	<code>\because^*</code>	...	<code>\dotsi</code>	..	<code>\therefore^*</code>
...	<code>\dotsb</code>	...	<code>\dotsm</code>		
...	<code>\dotsc</code>	...	<code>\dotso</code>		

\* `\because` and `\therefore` are defined as binary relations and therefore also appear in Table 99 on page 68.

The *AMS* `\dots`\_ symbols are named according to their intended usage: `\dotsb` between pairs of binary operators/relations, `\dotsc` between pairs of commas, `\dotsi` between pairs of integrals, `\dotsm` between pairs of multiplication signs, and `\dotso` between other symbol pairs.

TABLE 308: *wasysym* Dots

..	<code>\wasytherefore</code>
----	-----------------------------

TABLE 309: MnSymbol Dots

$\cdot$	<code>\cdot</code>	$\cdots$	<code>\hdotdot</code>	$\therefore$	<code>\udots</code>
$\therefore$	<code>\ddotdotdot</code>	$\cdots\cdots$	<code>\hdots</code>	$\therefore$	<code>\uptherefore</code>
$\therefore$	<code>\ddots</code>	$\therefore\cdots$	<code>\leftttherefore</code>	$:$	<code>\vdotdot</code>
$\therefore$	<code>\diamondddots</code>	$\therefore\cdots$	<code>\rightttherefore</code>	$:$	<code>\vdots</code>
$\therefore$	<code>\downttherefore</code>	$\therefore\cdots$	<code>\squaredots</code>		
$\therefore$	<code>\fivedots</code>	$\therefore\cdots$	<code>\udotdot</code>		

MnSymbol defines `\therefore` as `\uptherefore` and `\because` as `\downttherefore`. Furthermore, `\cdotp` and `\colon` produce the same glyphs as `\cdot` and `\vdotdot` respectively but serve as TeX math punctuation (class 6 symbols) instead of TeX binary operators (class 2).

All of the above except `\hdots` and `\vdots` are defined as binary operators and therefore also appear in Table 59 on page 39.

TABLE 310: fdsymbol Dots

$\cdot$	<code>\cdot</code>	$\cdots$	<code>\hdots</code>	$\therefore$	<code>\udots</code>
$\therefore$	<code>\ddotdotdot</code>	$\cdots\cdots$	<code>\leftttherefore</code>	$\therefore$	<code>\uptherefore</code>
$\therefore$	<code>\ddots</code>	$\therefore\cdots$	<code>\rightttherefore</code>	$:$	<code>\vdotdot</code>
$\therefore$	<code>\downttherefore</code>	$\therefore\cdots$	<code>\squaredots</code>		
$\cdots$	<code>\hdotdot</code>	$\cdots\cdots$	<code>\udotdot</code>		

fdsymbol defines `\adots` as a synonym for `\udots`; `\because` as a synonym for `\downttherefore`; `\cdotp` as a synonym for `\cdot`; `\cdots` as a synonym for `\hdots`; `\Colon` as a synonym for `\squaredots`; `\colon`, `\mathcolon`, and `\mathratio` as synonyms for `\vdotdot`; and `\therefore` as a synonym for `\uptherefore`. (Some of these serve different mathematical roles, such as relations versus binary operators.)

TABLE 311: stix Dots

$\therefore$	<code>\adots</code>	$\cdots$	<code>\cdots</code>	$\therefore$	<code>\fourvdots</code>
$\therefore$	<code>\because</code>	$\therefore\cdots$	<code>\Colon</code>	$\therefore$	<code>\ldotp</code>
$\cdot$	<code>\cdot</code>	$\therefore\cdots$	<code>\ddots</code>	$\cdots$	<code>\mathellipsis</code>
$\cdot$	<code>\cdotp</code>	$\cdots$	<code>\enleadertwodots</code>	$\therefore$	<code>\therefore</code>

stix defines `\centerdot` as a synonym for `\cdotp` and `\dotsb` and `\dotsm` as synonyms for `\cdots`.

TABLE 312: `mathdots` Dots

```
⋮ ⋯ \ddots ⋮ ⋯ \iddots ⋮ \vdots
```

Unlike the default definitions of the above (Table 306), `mathdots`'s commands are designed to scale properly with the surrounding font size.

TABLE 313: `yhmath` Dots

```
⋮ ⋯ \adots
```

TABLE 314: `teubner` Dots

```
: \: ; ; \; : \? :: \antilabe
```

TABLE 315: `logix` Dots

```
. \BndDot : \Cln ... \LDots .. \Thus
... \CDots . \Dt .. \Since : \VDots
```

`logix` requires either `Luatex` or `Xtex`.

TABLE 316: `begriff` Begriffsschrift Symbols

```
| \BGassert - \BGcontent _ \BGnot
[ b \BGconditional{a}{b} \underline{a} \BGquant{a}
```

The `begriff` package contains additional commands for typesetting Frege's Begriffsschrift notation for second-order logic. See the `begriff` documentation for more information.

TABLE 317: frege Begriffsschrift Symbols

$\vdash \text{—}$	<code>\Facontent</code>	$\vdash \text{—}$	<code>\Fanncontent</code>	$\dashv \text{—}$	<code>\Fncontent</code>
$\vdash \text{—}$	<code>\Fancontent</code>	$\dashv \text{—}$	<code>\Fcontent</code>	$\dashv \text{—}$	<code>\Fnncontent</code>
$\vdash \overset{\alpha}{\text{—}}$	<code>\Fannquant{a}</code>	$\vdash \overset{\alpha}{\text{—}}$	<code>\Faquant{a}</code>	$\dashv \overset{\alpha}{\text{—}}$	<code>\Fnquant{a}</code>
$\vdash \overset{\alpha}{\text{—}}$	<code>\Fannquantn{a}</code>	$\vdash \overset{\alpha}{\text{—}}$	<code>\Faquantn{a}</code>	$\dashv \overset{\alpha}{\text{—}}$	<code>\Fnquantn{a}</code>
$\vdash \overset{\alpha}{\text{—}}$	<code>\Fannquantnn{a}</code>	$\vdash \overset{\alpha}{\text{—}}$	<code>\Faquantnn{a}</code>	$\dashv \overset{\alpha}{\text{—}}$	<code>\Fnquantnn{a}</code>
$\vdash \overset{\alpha}{\text{—}}$	<code>\Fanquant{a}</code>	$\vdash \overset{\alpha}{\text{—}}$	<code>\Fnnquant{a}</code>	$\dashv \overset{\alpha}{\text{—}}$	<code>\Fquantn{a}</code>
$\vdash \overset{\alpha}{\text{—}}$	<code>\Fanquantn{a}</code>	$\vdash \overset{\alpha}{\text{—}}$	<code>\Fnnquantn{a}</code>	$\dashv \overset{\alpha}{\text{—}}$	<code>\Fquantnn{a}</code>
$\vdash \overset{\alpha}{\text{—}}$	<code>\Fanquantnn{a}</code>	$\vdash \overset{\alpha}{\text{—}}$	<code>\Fnnquantnn{a}</code>	$\dashv \overset{\alpha}{\text{—}}$	<code>\Fquantnnn{a}</code>

The `frege` package contains additional commands for typesetting Frege's Begriffsschrift notation for second-order logic. See the `frege` documentation for more information.

TABLE 318: mathcomp Math Symbols

$^{\circ}\text{C}$	<code>\tccentigrade</code>	$\Omega$	<code>\tcohm</code>	$\%$	<code>\tcpethousand</code>
$\mu$	<code>\tcmu</code>	$\%$	<code>\tcpertenthousand</code>		

TABLE 319: marvosym Math Symbols

$\triangleleft$	<code>\AngleSign</code>	$\geq$	<code>\LargerOrEqual</code>	$\times$	<code>\MVMultiplication</code>
$\Rightarrow$	<code>\Conclusion</code>	$\leq$	<code>\LessOrEqual</code>	$.$	<code>\MVPeriod</code>
$\equiv$	<code>\Congruent</code>	$\cdot$	<code>\MultiplicationDot</code>	$+$	<code>\MVPlus</code>
$\cong$	<code>\Corresponds</code>	$,$	<code>\MVComma</code>	$\rightarrow$	<code>\MVRightArrow</code>
$/$	<code>\Divides</code>	$/$	<code>\MVDivision</code>	$)$	<code>\MVRightBracket</code>
$\not $	<code>\DividesNot</code>	$($	<code>\MVLeftBracket</code>	$\neq$	<code>\NotCongruent</code>
$\Leftrightarrow$	<code>\Equivalence</code>	$-$	<code>\MVMinus</code>		

TABLE 320: marvosym Digits

$0$	<code>\MVZero</code>	$2$	<code>\MVTwo</code>	$4$	<code>\MVFour</code>	$6$	<code>\MVSix</code>	$8$	<code>\MVEight</code>
$1$	<code>\MVOne</code>	$3$	<code>\MVThree</code>	$5$	<code>\MVFive</code>	$7$	<code>\MVSeven</code>	$9$	<code>\MVNine</code>

TABLE 321: fge Digits

$\infty$	<code>\fgeleftthree</code>	$\infty$	<code>\fgerighttwo</code>	$\emptyset$	<code>\fgestruckzero</code>
$\infty$	<code>\fgelefttwo</code>	$\infty$	<code>\fgestruckone</code>		

TABLE 322: dozenal Base-12 Digits

\zeta	\x	\varepsilon	\e
-------	----	-------------	----

TABLE 323: mathabx Mayan Digits

\circledcirc	\maya{0}	:	\maya{2}	:	\maya{4}
.	\maya{1}	:	\maya{3}		\maya{5}

TABLE 324: stix Infinities

\circledcirc	\acidfree	\infty	\infnty	\infty	\tieinfty
\infty	\iinfin	\phi	\nvinfty		

TABLE 325: stix Primes

'	\prime	'	\backprime
"	\dprime	"	\backdprime
'''	\trprime	'''	\backtrprime
''''	\qprime		

TABLE 326: stix Empty Sets

\emptyset	\emptyset	\emptysetbar	\emptysetbar	\varnothing	\varnothing
\emptyset	\emptysetoarr	\emptyset	\emptysetocirc	\emptyset	
\emptyset	\emptysetoarrl	\emptyset	\revemptyset		

TABLE 327: *AMS* Angles

\angle	\angle	\angle	\measuredangle	\angle	\sphericalangle
--------	--------	--------	----------------	--------	-----------------

TABLE 328: MnSymbol Angles

\angle	\angle	\angle	\measuredangle	\angle	\sphericalangle
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TABLE 329: *fdsymbol* Angles

$\angle$	<code>\angle</code>	$\triangleright$	<code>\revangle</code>	$\triangleleft$	<code>\sphericalangle</code>
$\triangleleft$	<code>\measuredangle</code>	$\triangleright$	<code>\revmeasuredangle</code>	$\triangleleft$	<code>\sphericalangledown</code>
$\triangleleft$	<code>\measuredrightangle</code>	$\sqsubset$	<code>\rightangle</code>	$\triangleright$	<code>\sphericalangleleft</code>
$\triangleleft$	<code>\measuredrightangledot</code>	$\sqsubset$	<code>\rightanglesquare</code>	$\triangleright$	<code>\sphericalangleup</code>

*fdsymbol* defines `\measuredangleleft` as a synonym for `\revmeasuredangle`; `\revsphericalangle` and `\gtlpar` as synonyms for `\sphericalangleleft`; `\rightanglesqr` as a synonym for `\rightanglesquare`; and `\rightangledot` as a synonym for `\measuredrightangledot`.

TABLE 330: *boisik* Angles

$\angle$	<code>\angle</code>	$\sqsubset$	<code>\rightangle</code>	$\triangleleft$	<code>\sphericalangle</code>
$\triangleleft$	<code>\measuredangle</code>	$\triangleleft$	<code>\rightangledot</code>	$\triangleleft$	<code>\sphericalangle</code>
$\triangleleft$	<code>\measuredrightangle</code>	$\triangleleft$	<code>\rightanglesqr</code>	$\triangleleft$	<code>\sphericalangle</code>

TABLE 331: *stix* Angles

$\angle$	<code>\angdn</code>	$\triangleleft$	<code>\measanglerutone</code>	$\triangleleft$	<code>\rightangledot</code>
$\angle$	<code>\angle</code>	$\triangleleft$	<code>\measangleultonw</code>	$\triangleleft$	<code>\rightanglesqr</code>
$\triangleleft$	<code>\angles</code>	$\triangleleft$	<code>\measangleurtone</code>	$\triangleleft$	<code>\sphericalangle</code>
$\leq$	<code>\angleubar</code>	$\triangleleft$	<code>\measuredangle</code>	$\triangleright$	<code>\sphericalangleup</code>
$\triangleright$	<code>\gtlpar</code>	$\triangleleft$	<code>\measuredangleleft</code>	$\triangleleft$	<code>\threedangle</code>
$\triangleleft$	<code>\measangledltosw</code>	$\triangleleft$	<code>\measuredrightangle</code>	$\triangleright$	<code>\turnangle</code>
$\triangleleft$	<code>\measangledrtose</code>	$\triangleleft$	<code>\rangledownzigzagarrow</code>	$\sqsubset$	<code>\wideangledown</code>
$\triangleright$	<code>\measangleldtosw</code>	$\triangleleft$	<code>\revangle</code>	$\sqsubset$	<code>\wideangleup</code>
$\triangleleft$	<code>\measanglelutronw</code>	$\triangleleft$	<code>\revangleubar</code>	$\triangleleft$	<code>\wideangleup</code>
$\triangleright$	<code>\measanglerdttose</code>	$\triangleleft$	<code>\rightangle</code>	$\triangleleft$	<code>\rightangle</code>

TABLE 332: *typicons* Decorative Mathematical Symbols

$\div$	<code>\tiDivide</code>	$\infty$	<code>\tiInfinity</code>	$\pi$	<code>\tiPi</code>
$\div$	<code>\tiDivideOutline</code>	$\infty$	<code>\tiInfinityOutline</code>	$+$	<code>\tiPlus</code>
$=$	<code>\tiEquals</code>	$-$	<code>\tiMinus</code>	$\oplus$	<code>\tiPlusOutline</code>
$\equiv$	<code>\tiEqualsOutline</code>	$=$	<code>\tiMinusOutline</code>	$\sqsubset$	<code>\wideangleup</code>

See also `\tiTimes` ( $\times$ ) and `\tiTimesOutline` ( $\otimes$ ) in Table 422. All *typicons* symbols are intended to be used in text mode, not math mode.

*typicons* requires either  $\text{Lua}\text{\LaTeX}$  or  $\text{Xe}\text{\LaTeX}$ .

TABLE 333: fontawesome5 Decorative Mathematical Symbols

$\div$	<code>\faDivide</code>	$\lessdot$	<code>\faLessThan</code>	$\%$	<code>\faPercentage</code>
$=$	<code>\faEquals</code>	$\lessgtr$	<code>\faLessThanEqual</code>	$+$	<code>\faPlus</code>
$>$	<code>\faGreaterThan</code>	$-$	<code>\faMinus</code>	$?$	<code>\faQuestion</code>
$\geq$	<code>\faGreaterThanOrEqual</code>	$\neq$	<code>\faNotEqual</code>		
$\infty$	<code>\faInfinity</code>	$\%$	<code>\faPercent</code>		

See also `\faTimes` ( $\times$ ) in Table 423. All fontawesome5 symbols are intended to be used in text mode, not math mode.

TABLE 334: Miscellaneous L<sup>A</sup>T<sub>E</sub>X 2 <sub>$\varepsilon$</sub>  Math Symbols

$\aleph$	<code>\aleph</code>	$\Box$	<code>\Box</code> <sup>*,†</sup>	$\nabla$	<code>\nabla</code>	$\triangle$	<code>\triangle</code>
$\emptyset$	<code>\emptyset</code> <sup>‡</sup>	$\diamond$	<code>\Diamond</code> <sup>*</sup>	$\neg$	<code>\neg</code>		
$\angle$	<code>\angle</code>	$\infty$	<code>\infty</code>	$'$	<code>\prime</code>		
$\backslash$	<code>\backslash</code>	$\backslash$	<code>\backslash</code>	$\surd$	<code>\surd</code>		

\* Not predefined in L<sup>A</sup>T<sub>E</sub>X 2 <sub>$\varepsilon$</sub> . Use one of the packages `latexsym`, `amsfonts`, `amssymb`, `txfonts`, `pxfonts`, or `wasysym`. Note, however, that `amsfonts` and `amssymb` define `\Diamond` to produce the same glyph as `\lozenge` (“◊”); the other packages produce a squarer `\Diamond` as depicted above.

† To use `\Box`—or any other symbol—as an end-of-proof (Q.E.D.) marker, consider using the `ntheorem` package, which properly juxtaposes a symbol with the end of the proof text.

‡ Many people prefer the look of *AMS*’s `\varnothing` (“∅”, Table 335) to that of L<sup>A</sup>T<sub>E</sub>X’s `\emptyset`.

TABLE 335: Miscellaneous *AMS* Math Symbols

$\backprime$	<code>\backprime</code>	$\blacktriangledown$	<code>\blacktriangledown</code>	$\mho$	<code>\mho</code>
$\bigstar$	<code>\bigstar</code>	$\diagdown$	<code>\diagdown</code>	$\square$	<code>\square</code>
$\blacklozenge$	<code>\blacklozenge</code>	$\diagup$	<code>\diagup</code>	$\triangledown$	<code>\triangledown</code>
$\blacksquare$	<code>\blacksquare</code>	$\eth$	<code>\eth</code>	$\varnothing$	<code>\varnothing</code>
$\blacktriangle$	<code>\blacktriangle</code>	$\lozenge$	<code>\lozenge</code>	$\vartriangle$	<code>\vartriangle</code>

TABLE 336: Miscellaneous wasysym Math Symbols

$\Box$	<code>\Box</code>	$\diamond$	<code>\Diamond</code>	$\mho^*$	<code>\mho^*</code>	$\varangle$	<code>\varangle</code>
--------	-------------------	------------	-----------------------	----------	---------------------	-------------	------------------------

\* `wasysym` also defines an `\agem0` symbol, which is the same glyph as `\mho` but is intended for use in text mode.

TABLE 337: Miscellaneous txfonts/pfxfonts Math Symbols

◆	\Diamondblack	◊	\lambdabar
	\Diamonddot		\lambda

TABLE 338: Miscellaneous mathabx Math Symbols

◦	\degree	〃	\fourth	≷	\measuredangle	〃	\second
＼	\diagdown	#	\hash	≸	\pitchfork	≶	\sphericalangle
／	\diagup	∞	\infty	≸	\proto	〃	\third
∅	\diameter	×	\leftthreetimes	×	\rightthreetimes	#	\varhash

TABLE 339: Miscellaneous MnSymbol Math Symbols

¬	\backneg	∅	\diameter	¬	\invneg	¬	\neg
\backprime	\backprime	∞	\infty	✖	\maltese	/	\prime
✓	\checkmark	⊍	\invbackneg	▽	\nabla	∫	\smallint

MnSymbol defines \emptyset and \varnothing as synonyms for \diameter; \lnot and \minushookdown as synonyms for \neg; \minushookup as a synonym for \invneg; \hookdownminus as a synonym for \backneg; and, \hookupminus as a synonym for \invbackneg.

TABLE 340: Miscellaneous Internal MnSymbol Math Symbols

…	\partialvardint	…	\partialvartint
˘	\partialvardlanddownint	˘	\partialvartlanddownint
˙	\partialvardlandupint	˙	\partialvartlandupint
○	\partialvardlcircleleftint	○	\partialvartlcircleleftint
○	\partialvardlcirclerightint	○	\partialvartlcirclerightint
○	\partialvardoint	○	\partialvartoint
○	\partialvardrcircleleftint	○	\partialvartrcicleleftint
○	\partialvardrcirclerightint	○	\partialvartrcirclerightint
‐	\partialvardstrokedint	‐	\partialvartstrokedint
Σ	\partialvardsumint	Σ	\partialvartsumint

These symbols are intended to be used internally by MnSymbol to construct the integrals appearing in Table 87 on page 58 but can nevertheless be used in isolation.

TABLE 341: Miscellaneous *fdsymbol* Math Symbols

¬	\backneg	¬	\intprod	/	\prime
⋮	\backprime	⊍	\intprodr	⊓	\revemptyset
✓	\checkmark	¬	\invneg	▽	\sector
∅	\emptyset	✖	\maltese	∫	\smallint
∞	\infty	¬	\neg		

*fdsymbol* defines \hookdownminus, \invneg, and \invnot as synonyms for \backneg; \lnot and \minushookdown as synonyms for \neg; \hookupminus and \turnedbackneg as synonyms for \intprod; \minushookup, \turnedneg, and \turnednot as synonyms for \intprodr; and \diameter and \varnothing as synonyms for \emptyset.

TABLE 342: Miscellaneous *boisik* Math Symbols

϶	\backepsilon	+	\hermitmatrix	⤷	\notbot
⋮	\backprime	∞	\iinfin	⤸	\nottop
✓	\checkmark	¬	\invnot	⤧	\riota
□	\dalambert	λ	\lambdaabar	~	\sinewave
↙	\diagdown	λ	\lambdadaslash	∅	\varnothing
↗	\diagup	✖	\maltese		

TABLE 343: Miscellaneous *stix* Math Symbols

≈	\accurrent	+	\hermitmatrix	⊜	\PropertyLine
\	\backslash	-	\hyphenbullet	■	\QED
≡	\bbbrktbrk	~~	\hzigzag	??	\Question
⊥	\bigbot	Δ	\increment	×	\rdiagovfdiag
☰	\biginterleave	▣	\inversebullet	⤵	\rightouterjoin
⊤	\bigtop	¬	\invnot	⤣	\sansLmirrored
☺	\blacksmiley	▷	\Join	⤥	\sansLturned
	\bracevert	□	\laplac	~	\sinewave
^	\caretinsert	▷	\leftouterjoin	—	\strns
✓	\checkmark	↶	\llarc	‡	\thermod
▷	\conictaper	↷	\lrarc	○	\topcir
≥	\danger	✖	\maltese	⊓	\turnednot
↙	\diagdown	§	\mathsection	⊓	\ubrbrak
↗	\diagup	‐	\mathvisiblespace	⤨	\ularc
∅	\diameter	∇	\nabla	⤩	\urarc

(continued on next page)

(continued from previous page)

$\ast$	<code>\dingasterisk</code>	$\neg$	<code>\neg*</code>	$\#$	<code>\viewdata</code>
$\times$	<code>\elinters</code>	$\text{—}$	<code>\obrbrak</code>	$\text{—}$	<code>\vzigzag</code>
$\eth$	<code>\eth</code>	$\text{—}$	<code>\perps</code>	$\text{—}$	<code>\yen</code>
$!!$	<code>\Exclam</code>	$\text{—}$	<code>\postalmark</code>	$\text{—}$	<code>\zcmp</code>
$\times$	<code>\fdiagovrdiag</code>	$\curvearrowleft$	<code>\profline</code>	$\gg$	<code>\zpipe</code>
$\bowtie$	<code>\fullouterjoin</code>	$\curvearrowright$	<code>\profsurf</code>	$\uparrow$	<code>\zproject</code>

\* stix defines `\lnot` as a synonym for `\neg`.

TABLE 344: Miscellaneous `textcomp` Text-mode Math Symbols

$\circ$	<code>\textdegree</code> *	$\frac{1}{2}$	<code>\textonehalf</code> †	$\frac{3}{4}$	<code>\textthreequarters</code> †
$\div$	<code>\textdiv</code>	$\frac{1}{4}$	<code>\textonequarter</code> †	$\frac{3}{8}$	<code>\textthreesuperior</code>
$/$	<code>\textfractionsolidus</code>	$\frac{1}{1}$	<code>\textonesuperior</code>	$\times$	<code>\texttimes</code>
$-$	<code>\textlnot</code>	$\pm$	<code>\textpm</code>	$\frac{2}{2}$	<code>\texttwosuperior</code>
$-$	<code>\textminus</code>	$\sqrt{\phantom{x}}$	<code>\textsurd</code>		

\* If you prefer a larger degree symbol you might consider defining one as “`\ensuremath{^\circ}`” (“ $^{\circ}$ ”).

† `nicefrac` (part of the `units` package) or the newer `xfrac` package can be used to construct vulgar fractions like “ $1/2$ ”, “ $1/4$ ”, “ $3/4$ ”, and even “ $c/o$ ”.

TABLE 345: Miscellaneous `fge` Math Symbols

$\backslash$	<code>\fgebackslash</code>	$\cap$	<code>\fgecap</code>	$\cup$	<code>\fgecupacute</code>	$\setminus$	<code>\fgelangle</code>
$\triangleleft$	<code>\fgebaracute</code>	$\sqcap$	<code>\fgecapbar</code>	$\sqcup$	<code>\fgecupbar</code>	$\sqsetminus$	<code>\fgeupbracket</code>
$\bowtie$	<code>\fgebarcap</code>	$\cup$	<code>\fgecup</code>	$\bowtie$	<code>\fgeinfty</code>		

TABLE 346: Miscellaneous `mathdesign` Math Symbols

$\llcorner$  `\rightangle`

TABLE 347: Miscellaneous logix Math Symbols

$\otimes$	<code>\Aor</code>	$\otimes$	<code>\FncCntrs</code>	$\sqcup$	<code>\MapJoin</code>	$\cup$	<code>\SetJoin</code>
$\triangleright$	<code>\Append</code>	$\circ$	<code>\FncComp</code>	$\sqcap$	<code>\MapMeet</code>	$\cap$	<code>\SetMeet</code>
$\bullet$	<code>\BncBistab</code>	$\bullet$	<code>\ForComp</code>	$\oplus$	<code>\Mnd</code>	$\Delta$	<code>\SetSymDiff</code>
$\sqcup$	<code>\BnchJoin</code>	$\omega$	<code>\FrstOrd</code>	$\divideontimes$	<code>\Mor</code>	$\lrcorner$	<code>\SimPerp</code>
$\sqcap$	<code>\BnchMeet</code>	$\nu$	<code>\GrtFix</code>	$\triangleleft$	<code>\Normal</code>	$\smile$	<code>\SInCoh</code>
$\#$	<code>\Catenate</code>	$\asymp$	<code>\InCoh</code>	$?$	<code>\OfCrse</code>	$\oplus$	<code>\SmCircPlus</code>
$\tau$	<code>\Choice</code>	$\infty$	<code>\Infin</code>	$\&$	<code>\QuantAAnd</code>	$\otimes$	<code>\SmCircStar</code>
$T$	<code>\Choices</code>	$i$	<code>\LcgBistab</code>	$\sqcup$	<code>\QuantBnchJoin</code>	$\otimes$	<code>\SmCircTimes</code>
$\diamond$	<code>\Coh</code>	$\oplus$	<code>\LgCircPlus</code>	$\sqcap$	<code>\QuantBnchMeet</code>	$\downarrow$	<code>\VeeJoin</code>
$\parallel$	<code>\Concat</code>	$\otimes$	<code>\LgCircStar</code>	$\divideontimes$	<code>\QuantMor</code>	$\uparrow$	<code>\VeeMeet</code>
$\prec$	<code>\Cover</code>	$\otimes$	<code>\LgCircTimes</code>	$\cup$	<code>\QuantSetJoin</code>	$!$	<code>\WhyNot</code>
$\vec{v}$	<code>\ExGrtFix</code>	$\mu$	<code>\LstFix</code>	$\cap$	<code>\QuantSetMeet</code>		
$\vec{\mu}$	<code>\ExLstFix</code>	$\square$	<code>\MapComp</code>	$\sim$	<code>\SCoh</code>		

logix requires either `LuaLaTeX` or `XeLaTeX`.

TABLE 348: Math Alphabets

Font sample	Generating command	$\text{\TeX}$ font	Required package
ABCdef123	<code>\mathrm{ABCdef123}</code>	cmr10	<i>none</i>
<i>ABCdef123</i>	<code>\mathit{ABCdef123}</code>	cmmi10	<i>none</i>
<i>ABCdef123</i>	<code>\mathnormal{ABCdef123}</code>	cmmi10	<i>none</i>
<i>A<small>B</small>C</i>	<code>\mathcal{ABC}</code>	cmsy10	<i>none</i>
<i>A<small>B</small>C</i>	<code>\mathscr{ABC}</code> <i>or</i> <code>\mathcal{ABC}</code>	rsfs10	<code>mathrsfs</code>
<i>A<small>B</small>C</i>	<code>\mathcal{ABC}</code>	rsfs10	<code>calrsfs</code>
<i>A<small>B</small>C</i>	<code>\mathcal{ABC}</code>	eusm10	<code>euscript</code> with the <code>mathcal</code> option
<i>A<small>B</small>C</i>	<code>\mathcal{ABC}</code>	eusm10	<code>euscript</code> with the <code>mathscr</code> option
<i>A<small>B</small>C</i>	<code>\mathcal{ABC}</code> <i>or</i> <code>\mathscr{ABC}</code>	rsfso10	<code>rsfso</code>
<i>A<small>B</small>C</i>	<code>\mathcal{ABC}</code> <i>or</i> <code>\mathscr{ABC}</code>	rsfso10	<code>rsfso</code> with the <code>scr</code> option
<i>A<small>B</small>C</i>	<code>\mathcal{ABC}</code>	urwchancal	<code>urwchancal*</code>
<i>A<small>B</small>C</i>	<code>\mathcal{ABC}</code>	urwchancal	<code>urwchancal*</code> with the <code>mathscr</code> option
<i>A<small>B</small>C</i>	<code>\mathbb{ABC}</code>	msbm10	<code>amsfonts</code> , <sup>§</sup> <code>amssymb</code> , <code>txfonts</code> , or <code>pxfonts</code>
<i>A<small>B</small>C</i>	<code>\varmathbb{ABC}</code>	txmia	<code>txfonts</code> or <code>pxfonts</code>
<i>ABCdef123</i>	<code>\mathbb{ABCdef123}</code>	bbold10	<code>bbold</code> or <code>mathbbol</code> <sup>†</sup>
<i>ABCdef123</i>	<code>\mathbb{ABCdef123}</code>	mbb10	<code>mbboard</code> <sup>†</sup>
<i>A<small>B</small>Cdef12</i>	<code>\mathbb{A}\mathbb{B}\mathbb{C}\mathbb{d}\mathbb{e}\mathbb{f}12</code>	bbm10	<code>bbm</code>
<i>A<small>B</small>Cdef12</i>	<code>\mathbb{A}\mathbb{B}\mathbb{C}\mathbb{d}\mathbb{e}\mathbb{f}12</code>	bbmss10	<code>bbm</code>
<i>ABCdef12</i>	<code>\mathbb{A}\mathbb{B}\mathbb{C}\mathbb{d}\mathbb{e}\mathbb{f}12</code>	bbmtt10	<code>bbm</code>
<i>A<small>B</small>C1</i>	<code>\mathds{ABC1}</code>	dsrom10	<code>dsfont</code>
<i>A<small>B</small>C1</i>	<code>\mathds{ABC1}</code>	dss10	<code>dsfont</code> with the <code>sans</code> option
<i>ABCdef123</i>	<code>\mathbb{ABCdef123}</code>	DSSerif	<code>dsserif</code>
<i>ABCdef123</i>	<code>\mathbb{ABCdef123}</code>	DSSerif-Bold	<code>dsserif</code>
<i>A<small>B</small>C</i>	<code>\symA\symB\symC</code>	china10	$\text{\textcircled{G}}\text{\textcircled{A}}\text{\textcircled{2}}\text{\textcircled{e}}$ <sup>‡</sup>
<i>A<small>B</small>Cdef123</i>	<code>\mathfrak{ABCdef123}</code>	eufm10	<code>eufrak</code>
<i>A<small>B</small>Cdef123</i>	<code>\textfrak{ABCdef123}</code>	yfrak	<code>yfonts</code> <sup>¶</sup>
<i>A<small>B</small>Cdef123</i>	<code>\textswab{ABCdef123}</code>	yswab	<code>yfonts</code> <sup>¶</sup>
<i>A<small>B</small>Cdef123</i>	<code>\textgoth{ABCdef123}</code>	ygoth	<code>yfonts</code> <sup>¶</sup>

The “ $\text{\TeX}$  font” column lists the underlying  $\text{\TeX}$  font (or, more accurately, the `.tfm` file) that provides the math alphabet. See the corresponding table in the associated Raw Font Tables document for the math alphabet’s complete character set.

<sup>\*</sup> `urwchancal` redefines `\mathcal` or `\mathscr` to use Zapf Chancery as the calligraphic or script font. However, like all `\mathcal` and `\mathscr` commands shown in Table 348, these support only uppercase letters. An alternative is to put “`\DeclareMathAlphabet{\mathpzc}{OT1}{pzc}{m}{it}`” in your document’s preamble to make `\mathpzc` typeset a wider set of characters in Zapf Chancery. Unfortunately, with this technique accents, superscripts, and subscripts don’t align as well as they do with `urwchancal`.

As a similar trick, you can typeset the Calligra font’s script “*z*” (or other calligraphic symbols) in math mode by loading the `calligra` package and putting “`\DeclareMathAlphabet{\mathcalligra}{T1}{calligra}{m}{n}`” in your document’s preamble to make `\mathcalligra` typeset its argument in the Calligra font. You may also want to specify “`\DeclareFontShape{T1}{calligra}{m}{n}{<->s*[2.2] callig15}{}{}`” to set Calligra at 2.2 times its design size for a better blend with typical body fonts.

<sup>†</sup> The `mathbbol` package defines some additional blackboard bold characters: parentheses, square brackets, angle brackets, and—if the `bbgreekl` option is passed to `mathbbol`—Greek letters. For instance, “ $\langle[\alpha\beta]\rangle$ ” is produced by “`\mathbb{(\Langle\Lbrack\Lparen\bbalpha\bbbeta\bbgamma\Rparen\Rbrack\Rangle)}`”.

`mbbold` extends the blackboard bold symbol set significantly further. It supports not only the Greek alphabet—including “Greek-like” symbols such as `\bbnabla` (“ $\nabla$ ”)—but also *all* punctuation marks, various currency symbols such as `\bbdollar` (“ $\$$ ”) and `\bbeuro` (“ $\text{€}$ ”), and the Hebrew alphabet (e.g., “`\bbfinalnum\bbyod\bbqof\bbpe`”  $\rightarrow$  “ $\text{פּ}$ ”).

<sup>‡</sup> The `\sym...` commands provided by the `GITAe` package are actually text-mode commands. They are included in Table 348 because they resemble the blackboard-bold symbols that appear in the rest of the table. In addition to the 26 letters of the English alphabet, `GITAe` provides three umlauted blackboard-bold letters: `\symAE` (“ $\mathbb{A}$ ”), `\symOE` (“ $\mathbb{O}$ ”), and `\symUE` (“ $\mathbb{U}$ ”). Note that `GITAe` does provide math-mode commands for the most common number-set symbols. These are presented in Table 207 on page 119.

<sup>¶</sup> As their `\text...` names imply, the fonts provided by the `yfonts` package are actually text fonts. They are included in Table 348 because they are frequently used in a mathematical context.

<sup>§</sup> An older (i.e., prior to 1991) version of the `AMS`’s fonts rendered  $\mathbb{C}$ ,  $\mathbb{N}$ ,  $\mathbb{R}$ ,  $\mathbb{S}$ , and  $\mathbb{Z}$  as  $C$ ,  $N$ ,  $R$ ,  $S$ , and  $Z$ . As some people prefer the older glyphs—much to the `AMS`’s surprise—and because those glyphs fail to build under modern versions of METAFONT, Berthold Horn uploaded PostScript fonts for the older blackboard-bold glyphs to CTAN, to the `fonts/msym10` directory. As of this writing, however, there are no  $\text{\LaTeX} 2\epsilon$  packages for utilizing the now-obsolete glyphs.

# Chapter 4

## Science and technology symbols

This chapter lists symbols that are employed in various branches of science and engineering.

TABLE 349: `gensymb` Symbols Defined to Work in Both Math and Text Mode

$^{\circ}\text{C}$	<code>\celsius</code>	$\mu$	<code>\micro</code>	$\%$	<code>\perthousand</code>
$^{\circ}$	<code>\degree</code>	$\Omega$	<code>\ohm</code>		

TABLE 350: `wasysym` Electrical and Physical Symbols

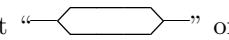
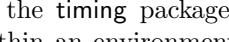
$\sim$	<code>\AC</code>	$\approx$	<code>\VHF</code>	$\sim\sim\sim$	<code>\photon</code>	$\approx$	<code>\HF</code>	$\sim\sim\sim\sim$	<code>\gluon</code>
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TABLE 351: `ifsym` Pulse Diagram Symbols

$\sqcup$	<code>\FallingEdge</code>	$\sqcup\sqcup$	<code>\LongPulseLow</code>	$\sqcup\sqcup$	<code>\PulseLow</code>	$\sqcup\sqcup$	<code>\ShortPulseHigh</code>
$\sqcup\sqcup$	<code>\LongPulseHigh</code>	$\sqcup\sqcup$	<code>\PulseHigh</code>	$\sqcup\sqcup$	<code>\RaisingEdge</code>	$\sqcup\sqcup$	<code>\ShortPulseLow</code>

In addition, within `\textifsym{...}`, the following codes are valid:

$-$	<code>l</code>	$-$	<code>m</code>	$-$	<code>h</code>	$-$	<code>d</code>	$<$	<code>&lt;</code>	$>$	<code>&gt;</code>
$\_$	<code>L</code>	$\_$	<code>M</code>	$\_$	<code>H</code>	$\_$	<code>D</code>	$<$	<code>&lt;&lt;</code>	$>$	<code>&gt;&gt;</code>

This enables one to write “`\textifsym{mm<DDD>mm}`” to get “” or “`\textifsym{L|H|L|H|L}`” to get “”. See also the `timing` package, which provides a wide variety of pulse-diagram symbols within an environment designed specifically for typesetting pulse diagrams.

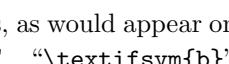
Finally, `\textifsym` supports the display of segmented digits, as would appear on an LCD: “`\textifsym{-123.456}`” produces “”. “`\textifsym{b}`” outputs a blank with the same width as an “”.

TABLE 352: `ar` Aspect Ratio Symbol
 $\mathcal{A}R \quad \backslash AR$ 
TABLE 353: `plimsoll` Plimsoll Symbol
 $\ominus \quad \backslash plimsoll$ 
TABLE 354: `textcomp` Text-mode Science and Engineering Symbols
 $^{\circ}\text{C} \quad \backslash textcelsius \quad \text{U} \quad \backslash textmho \quad \mu \quad \backslash textmu \quad \Omega \quad \backslash textohm$ 
TABLE 355: `steinmetz` Extensible Phasor Symbol
 $\langle abc \quad \backslash phase\{abc\}$ 

The `\phase` command uses the `pict2e` package to draw a horizontally and vertically scalable Steinmetz phasor symbol. Consequently, `\phase` works only with those TeX backends supported by `pict2e`. See the `pict2e` documentation for more information.

TABLE 356: `emf` Electromotive Force Symbols

$\mathcal{E}$	$\backslash emf$ with package option <code>boondox</code> (default)
$\mathcal{E}$	$\backslash emf$ with package option <code>cal*</code>
$\mathcal{E}$	$\backslash emf$ with package option <code>calligra</code>
$\mathcal{E}$	$\backslash emf$ with package option <code>chorus</code>
$\mathcal{E}$	$\backslash emf$ with package option <code>cmr</code>
$\mathcal{E}$	$\backslash emf$ with package option <code>fourier</code>
$\mathcal{E}$	$\backslash emf$ with package option <code>frcursive</code>
$\mathcal{E}$	$\backslash emf$ with package option <code>miamia</code>
$\mathcal{E}$	$\backslash emf$ with package option <code>rsfs</code>

\* With the `cal` package option, `\emf` uses `\mathcal{E}`. Hence, the depiction of “E” depends on the currently loaded math font.

TABLE 357: wasysym Astronomical Symbols

♀	\mercury	♂	\earth	♃	\jupiter	♂	\uranus	♄	\pluto
♀	\venus	♂	\mars	♄	\saturn	♀	\neptune		
⊕	\astrosun	○	\fullmoon	☾	\leftmoon	●	\newmoon	☽	\rightmoon
♈	\aries	♉	\cancer	♊	\libra	♒	\aquarius		
♉	\taurus	♊	\leo	♋	\scorpio	♑	\capricornus		
♊	\gemini	♋	\virgo	♌	\sagittarius	♓	\pisces		
☊	\ascnode	☋	\descnode	☌	\conjunction	☍	\opposition	♈	\vernal

TABLE 358: marvosym Astronomical Symbols

♀	\Mercury	♂	\Earth	♃	\Jupiter	♂	\Uranus	♀	\Pluto
♀	\Venus	♂	\Mars	♄	\Saturn	♀	\Neptune		
☽	\Moon	○	\Sun						
♈	\Aries	♉	\Cancer	♊	\Libra	♑	\Capricorn		
♉	\Taurus	♊	\Leo	♋	\Scorpio	♒	\Aquarius		
♊	\Gemini	♋	\Virgo	♌	\Sagittarius	♓	\Pisces		

Note that \Aries... \Pisces can also be specified with \Zodiac{1}... \Zodiac{12}.

TABLE 359: mathabx Astronomical Symbols

♀	\Mercury	⊕	\Earth	♃	\Jupiter	♂	\Uranus	♄	\Pluto
♀	\Venus	♂	\Mars	♄	\Saturn	♀	\Neptune	♂	\varEarth
○	\fullmoon	☽	\leftmoon	●	\newmoon	☽	\rightmoon	○	\Sun
♈	\Aries	♉	\Taurus	♊	\Gemini				

mathabx also defines \girl as an alias for \Venus, \boy as an alias for \Mars, and \Moon as an alias for \leftmoon.

TABLE 360: stix Astronomical Symbols

○	\astrosun	☽	\leftmoon	☽	\rightmoon	♀	\sun
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TABLE 361: `utfsym` Astronomical Symbols

◎	<code>\usym{2609}</code>	⌚	<code>\usym{2643}</code>	♏	<code>\usym{264F}</code>	●	<code>\usym{1F318}</code>
❖	<code>\usym{260A}</code>	ℏ	<code>\usym{2644}</code>	♐	<code>\usym{2650}</code>	🌙	<code>\usym{1F319}</code>
❖	<code>\usym{260B}</code>	⌘	<code>\usym{2645}</code>	♑	<code>\usym{2651}</code>	●	<code>\usym{1F31A}</code>
♂	<code>\usym{260C}</code>	Ψ	<code>\usym{2646}</code>	♒	<code>\usym{2652}</code>	☽	<code>\usym{1F31B}</code>
♂	<code>\usym{260D}</code>	ᴾ	<code>\usym{2647}</code>	♓	<code>\usym{2653}</code>	ⓘ	<code>\usym{1F31C}</code>
✿	<code>\usym{263C}</code>	γ	<code>\usym{2648}</code>	●	<code>\usym{1F311}</code>	♾	<code>\usym{1F31D}</code>
☽	<code>\usym{263D}</code>	♌	<code>\usym{2649}</code>	●	<code>\usym{1F312}</code>	●	<code>\usym{1F31E}</code>
☽	<code>\usym{263E}</code>	♊	<code>\usym{264A}</code>	●	<code>\usym{1F313}</code>	✿	<code>\usym{1F31F}</code>
♀	<code>\usym{263F}</code>	♉	<code>\usym{264B}</code>	○	<code>\usym{1F314}</code>	❖	<code>\usym{1F320}</code>
♀	<code>\usym{2640}</code>	♌	<code>\usym{264C}</code>	○	<code>\usym{1F315}</code>		
♂	<code>\usym{2641}</code>	♊	<code>\usym{264D}</code>	○	<code>\usym{1F316}</code>		
♂	<code>\usym{2642}</code>	♋	<code>\usym{264E}</code>	●	<code>\usym{1F317}</code>		

All `utfsym` symbols are implemented with `TikZ` graphics, not with a font. In addition to `\usym`, the `utfsym` package defines `\usymH`, which renders a symbol at a given height, and `\usymW`, which renders a symbol at a given width. See the `utfsym` documentation for more information.

TABLE 362: starfont Astronomical Symbols

☿	\Mercury	♂	\Mars	♃	\Uranus	♁	\varTerra
♀	\Venus	♄	\Jupiter	♅	\Neptune	♁	\varUranus
⊕	\Terra	♆	\Saturn	♇	\Pluto	♁	\varPluto
○	\Sun	☽	\Moon	☾	\varMoon		
♆	\Cupido	♉	\Zeus	♊	\Apollon	♋	\Vulkanus
♇	\Hades	♊	\Kronos	♋	\Admetos	♋	\Poseidon
∅	\Lilith	♌	\NorthNode	♍	\SouthNode		
♎	\Amor	♎	\Eros	♏	\Juno	♎	\Sappho
♎	\Ceres	♏	\Hidalgo	♏	\Pallas	♎	\Vesta
♎	\Chiron	♏	\Hygiea	♏	\Psyche		
⊗	\Fortune						
♈	\Aries	♉	\Leo	♊	\Sagittarius	♑	\varCapricorn
♉	\Taurus	♊	\Virgo	♋	\Capricorn		
♊	\Gemini	♋	\Libra	♌	\Aquarius		
♋	\Cancer	♌	\Scorpio	♍	\Pisces		
☌	\Conjunction	□	\Square	☍	\Semisextile		
☍	\Opposition	×	\Sextile	〽	\Semisquare		
△	\Trine	〽	\Quincunx	〽	\Sesquiquadrate		
A <sup>sc</sup>	\ASC	E <sup>p</sup>	\EastPoint	M <sup>c</sup>	\MC		
D <sup>sc</sup>	\DSC	I <sup>c</sup>	\IC	V <sup>x</sup>	\Vertex		
D!	\Direct	R <sub>x</sub>	\Retrograde	S!	\Station		
▲	\Air	▽	\Earth	△	\Fire	▽	\Water
N!	\Natal	★	\Pentagram	R <sup>ad</sup>	\Radix		

TABLE 363: wasysym APL Symbols

□	\APLbox	⊐	\APLinv	*	\APLstar
Ⓐ	\APLcomment	⊑	\APLleftarrowbox	△	\APLup
▽	\APLdown	⊒	\APLlog	⊑	\APLuparrowbox
⊓	\APLdownarrowbox	⊔	\APLminus	⊜	\notbackslash
⊔	\APLinput	⊕	\APLrightarrowbox	⊝	\notslash
a	\APLcirc{a}	⊘	\APLnot{a}	⊙	\APLvert{a}

TABLE 364: stix APL Symbols

	\APLboxquestion		\APLnotbackslash
	\APLboxupcaret		\APLnotslash

TABLE 365: apl APL Symbols

	\AB	..	\DD	\GD	\LK	\PD	\uparrow	\UA	\G	\ZG	\Q	\ZQ			
\alpha	\AM	\perp	\DE	\geq	\GE	\circ	\LO	\QQ	\_	\US	\H	\ZH	\R	\ZR	
\backslash	\BL	\triangleright	\DL	\rightarrow	\GO	\triangleright	\LU	\}	\RB	\U	\UU	\I	\ZI	\S	\ZS
\square	\BX	\diamond	\DM	\triangle	\GU	\neq	\NE	\dashv	\RK	\ast	\XQ	\J	\ZJ	\T	\ZT
\wedge	\CB	\boxdot	\DQ	\boxtimes	\IB	\neg	\NG	\rho	\RO	\A	\ZA	\K	\ZK	\U	\ZU
\Gamma	\CE	\cap	\DU	\sim	\IO	\wedge	\NN	\c	\RU	\B	\ZB	\L	\ZL	\V	\ZV
\Sigma	\CO	\tau	\EN	\{	\LB	\vee	\NR	\phi	\RV	\C	\ZC	\M	\ZM	\W	\ZW
\circ	\CR	\epsilon	\EP	\Delta	\LD	\sim	\NT	\circ	\SO	\D	\ZD	\N	\ZN	\X	\ZX
\divideontimes	\CS	\lfloor	\FL	\leq	\LE	\omega	\OM	\subseteq	\SS	\E	\ZE	\O	\ZO	\Y	\ZY
\downarrow	\DA	\mp	\FM	\otimes	\LG	\vee	\OR	\wp	\TR	\F	\ZF	\P	\ZP	\Z	\ZZ

TABLE 366: marvosym Computer Hardware Symbols

	\ComputerMouse		\ParallelPort		\SerialInterface
	\Keyboard		\Printer		\SerialPort

TABLE 367: keystroke Computer Keys

	\Alt		\Enter*		\PrtSc*
	\AltGr		\Esc*		\RArrow
	\Break*		\Home*		\Return
	\BSpace†		\Ins*		\Scroll*
	\Ctrl*		\LArrow		\Shift*
	\DArrow		\NumLock		\Spacebar
	\Del*		\PgDown*		\Tab†
	\End*		\PgUp*		\UArrow

\* Changes based on the language option passed to the `keystroke` package. For example, the `german` option makes `\Del` produce “” instead of “”.

† These symbols utilize the `rotating` package and therefore display improperly in most DVI viewers.

The `\keystroke` command draws a key with an arbitrary label. For example, “\keystroke{F7}” produces “”.

TABLE 368: ascii Control Characters (CP437)

☺	\SOH	█	\BS	*	\SI	-	\SYN	↔	\GS
☻	\STX	○	\HT	►	\DLE	‡	\ETB	▲	\RS
♥	\ETX	□	\LF	◀	\DCa	↑	\CAN	_	\US
♦	\EOT	♂	\VT	↕	\DCb	↓	\EM		
♣	\ENQ	♀	\FF	!!	\DCc	→	\SUB		
♠	\ACK	⊙	\CR	¶	\DCd	←	\ESC		
•	\BEL	◦	\SO	§	\NAK	↳	\FS		
						:	\splitvert		
◊	\DEL								

Code Page 437 (CP437), which was first utilized by the original IBM PC, uses the symbols \SOH through \US to depict ASCII characters 1–31 and \DEL to depict ASCII character 127. The \NUL symbol, not part of CP437, represents ASCII character 0. \NBSP, also not part of CP437, represents a nonbreaking space. \splitvert is merely the “|” character drawn as it was on the IBM PC.

TABLE 369: logic Logic Gates

	\ANDd		\BUFu		\NAND1		\ORd
	\AND1	/	\BusWidth		\NANDr		\OR1
	\ANDr		\INVd		\NANDu		\ORr
	\ANDu		\INV1		\NORd		\ORu
	\BUFd		\INVr		\NOR1		
	\BUFl		\INVu		\NORr		
	\BUFr		\NANDd		\NORu		

The `logic` package implements the digital logic-gate symbols specified by the U.S. Department of Defense’s MIL-STD-806 standard. Note that on CTAN, the package is *called* `logic`, but the package is *loaded* using `\usepackage{milstd}`. (There was already a—completely unrelated—`milstd` package on CTAN at the time of `logic`’s release.) Consequently, package details are listed under `milstd` in Table 697 and Table 698 on page 387.

TABLE 370: quantikz Quantum-Mechanics Notation

$\langle a  $	$\backslash bra{a}$	$  a \rangle$	$\backslash ket{a}$
$\langle a   b \rangle$	$\backslash braket{a}{b}$	$  a \rangle \langle a  $	$\backslash proj{a}$

All of these symbols work in both text and math mode and scale automatically to fit their argument(s).

TABLE 371: marvosym Communication Symbols

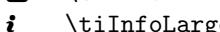
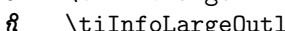
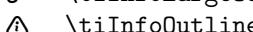
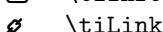
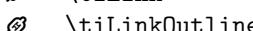
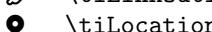
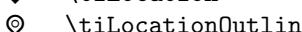
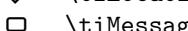
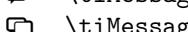
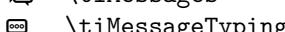
 \Email	 \fax	 \Faxmachine	 \Lightning	 \Pickup
 \EmailCT	 \FAX	 \Letter	 \Mobilefone	 \Telefon

TABLE 372: marvosym Engineering Symbols

 \Beam	 \Force	 \Octosteel	 \RoundedTTsteel
 \Bearing	 \Hexasteel	 \Rectpipe	 \Squarepipe
 \Circpipe	 \Lefttorque	 \Rectsteel	 \Squaresteel
 \Circsteel	 \Lineload	 \Righttorque	 \Tsteel
 \Fixedbearing	 \Loosebearing	 \RoundedLsteel*	 \TTsteel
 \Flatsteel	 \Lsteel	 \RoundedTsteel*	

\* \RoundedLsteel and \RoundedTsteel seem to be swapped, at least in the 2000/05/01 version of marvosym.

TABLE 373: typicons User-Interface Symbols

 \tiAdjustBrightness	 \tiInfo
 \tiAdjustContrast	 \tiInfoLarge
 \tiArchive	 \tiInfoLargeOutline
 \tiBackspace	 \tiInfoOutline
 \tiBackspaceOutline	 \tiLink
 \tiBatteryCharge	 \tiLinkOutline
 \tiBatteryFull	 \tiLocation
 \tiBatteryHigh	 \tiLocationOutline
 \tiBatteryLow	 \tiMessage
 \tiBatteryMid	 \tiMessages
 \tiBookmark	 \tiMessageTyping

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🚫 \tiCancel	⟳ \tiRefresh
🌐 \tiCancelOutline	⟳ \tiRefreshOutline
〽 \tiChartArea	rss \tiRss
〽 \tiChartAreaOutline	rss \tiRssOutline
〽 \tiChartBar	az \tiSortAlphabetically
〽 \tiChartBarOutline	az \tiSortAlphabeticallyOutline
〽 \tiChartLine	123 \tiSortNumerically
〽 \tiChartLineOutline	123 \tiSortNumericallyOutline
〽 \tiChartPie	✉ \tiSupport
〽 \tiChartPieOutline	tabs \tiTabsOutline
☁ \tiCloudStorage	grid \tiThLarge
☁ \tiCloudStorageOutline	grid \tiThLargeOutline
↔ \tiCode	list \tiThList
↔ \tiCodeOutline	list \tiThListOutline
⚙ \tiCog	menu \tiThMenu
⚙ \tiCogOutline	menu \tiThMenuOutline
css \tiCss	small \tiThSmall
DATABASE \tiDatabase	small \tiThSmallOutline
⬇ \tiDownload	upload \tiUpload
⬇ \tiDownloadOutline	upload \tiUploadOutline
☒ \tiEdit	warning \tiWarning
☒ \tiExport	warning \tiWarningOutline
☒ \tiExportOutline	waves \tiWaves
▼ \tiFilter	waves \tiWavesOutline
↳ \tiFlowChildren	wifi \tiWiFi
merge \tiFlowMerge	wifi \tiWiFiOutline
parallel \tiFlowParallel	zoom \tiZoom
switch \tiFlowSwitch	zoom \tiZoomIn
group \tiGroup	zoom \tiZoomInOutline
group \tiGroupOutline	zoom \tiZoomOut
html \tiHtml	zoom \tiZoomOutline
image \tiImage	zoom \tiZoomOutOutline
image \tiImageOutline	

typicons requires either  $\text{Lua}\text{\LaTeX}$  or  $\text{Xe}\text{\LaTeX}$ .

TABLE 374: fontawesome5 User-Interface Symbols

	\faUser		\faAddressBook		\faAddressBook[regular]		\faAddressCard		\faAddressCard[regular]		\faAdjust		\faAlignCenter		\faAlignJustify		\faAlignLeft		\faAlignRight		\faArrows*		\faAudioDescription		\faBackspace		\faBars		\faBatteryEmpty		\faBatteryFull		\faBatteryHalf		\faBatteryQuarter		\faBatteryThreeQuarters		\faBellSlash		\faBellSlash[regular]		\faBlog		\faBold		\faBookmark		\faBookmark[regular]		\faBorderAll		\faBorderNone		\faBorderStyle		\faCartArrowDown		\faCartPlus		\faChartArea		\faChartBar		\faChartBar[regular]		\faChartLine		\faChartPie		\faClipboard		\faClipboard[regular]		\faClipboardCheck		\faClone		\faClone[regular]		\faClosedCaptioning		\faClosedCaptioning[regular]		\faListUl		\faLocationArrow		\faMailBulk		\faMapMarked*		\faMapMarked		\faMapMarker*		\faMapMarker		\faMapPin		\faMicrophoneAltSlash		\faMicrophoneSlash		\faMinusCircle		\faMinusSquare		\faMinusSquare[regular]		\faMousePointer		\faMusic		\faNetworkWired		\faObjectGroup		\faObjectGroup[regular]		\faObjectUngroup		\faObjectUngroup[regular]		\faOutdent		\faPaste		\faPause		\faPauseCircle		\faPauseCircle[regular]		\faPhotoVideo		\faPlusCircle		\faPlusSquare		\faPlusSquare[regular]		\faPodcast		\faPoll		\faPortrait		\faPowerOff		\faPrint		\faProjectDiagram		\faQrcode		\faQuestionCircle		\faQuestionCircle[regular]		\faRandom		\faRedo*		\faRedo
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	\faCloudDownload*		\faRemoveFormat
	\faCloudUpload*		\faReply
	\faCode		\faReplyAll
	\faCodeBranch		\faRetweet
	\faCog		\faRoute
	\faColumns		\faRss
	\faComment*[regular]		\faRssSquare
	\faComment*		\faSave
	\faComment		\faSave[regular]
	\faComment[regular]		\faSearch
	\faCommentDollar		\faSearchDollar
	\faCommentDots		\faSearchLocation
	\faCommentDots[regular]		\faSearchMinus
	\faComments		\faSearchPlus
	\faComments[regular]		\faServer
	\faCommentsDollar		\faShapes
	\faCommentSlash		\faShare*
	\faCompress*		\faShare
	\faCompress		\faShareAltSquare
	\faCompressArrows*		\faShareSquare
	\faCopy		\faShareSquare[regular]
	\faCopy[regular]		\faSignal
	\faCrop*		\faSignature
	\faCrop		\faSignIn*
	\faCrosshairs		\faSignOut*
	\faCut		\faSitemap
	\faDatabase		\faSlidersH
	\faDesktop		\faSms
	\faDonate		\faSort
	\faDownload		\faSortAlphaDown*
	\faDrawPolygon		\faSortAlphaDown
	\faEdit		\faSortAlphaUp*
	\faEdit[regular]		\faSortAlphaUp
	\faEnvelope		\faSortAmountDown*
	\faEnvelope[regular]		\faSortAmountDown
	\faEnvelopeOpen		\faSortAmountUp*
	\faEnvelopeOpen[regular]		\faSortAmountUp
	\faEnvelopeOpenText		\faSortDown
	\faEnvelopeSquare		\faSortNumericDown*
	\faEraser		\faSortNumericDown
	\faEthernet		\faSortNumericUp*
	\faExchange*		\faSortNumericUp
	\faExclamationCircle		\faSortUp
	\faExclamationTriangle		\faSpellCheck
	\faExpand*		\faSpinner

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	\faExpand		\faSquareRoot*
	\faExpandArrows*		\faStoreAltSlash
	\faExternalLink*		\faStoreSlash
	\faExternalLinkSquare*		\faStream
	\faEye		\faStreetView
	\faEye[regular]		\faStrikethrough
	\faEyeSlash		\faSubscript
	\faEyeSlash[regular]		\faSuperscript
	\faFill		\faSync*
	\faFillDrip		\faSync
	\faFilm		\faTable
	\faFilter		\faTasks
	\faFingerprint		\faTerminal
	\faFire*		\faTextHeight
	\faFont		\faTextWidth
	\faGripHorizontal		\faTh
	\faGripLines		\faThLarge
	\faGripLinesVertical		\faThList
	\faGripVertical		\faTint
	\faHashtag		\faTintSlash
	\faHeading		\faToggleOff
	\faHistory		\faToggleOn
	\faIcons		\faTrashRestore*
	\faICursor		\faTrashRestore
	\faImage		\faUnderline
	\faImage[regular]		\faUndo*
	\faImages		\faUndo
	\faImages[regular]		\faUniversalAccess
	\faInbox		\faUnlink
	\faIndent		\faUpload
	\faInfo		\faVectorSquare
	\faInfoCircle		\faVideo
	\faItalic		\faVideoSlash
	\faLanguage		\faVoicemail
	\faLaptopCode		\faWindowClose
	\faLayerGroup		\faWindowClose[regular]
	\faLevelDown*		\faWindowMaximize
	\faLevelUp*		\faWindowMaximize[regular]
	\faLink		\faWindowMinimize
	\faList*[regular]		\faWindowMinimize[regular]
	\faList*		\faWindowRestore
	\faList		\faWindowRestore[regular]
	\faList01		

TABLE 375: `wasysym` Biological Symbols

♀	<code>\female</code>	♂	<code>\male</code>
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TABLE 376: `stix` Biological Symbols

♀	<code>\female</code>	♂	<code>\male</code>
⚥	<code>\Hermaphrodite</code>	♀	<code>\neuter</code>

TABLE 377: `marvosym` Biological Symbols

❶	<code>\FEMALE</code>	❷	<code>\FemaleMale</code>	❸	<code>\Male</code>	❹	<code>\Neutral</code>
❻	<code>\Female</code>	❼	<code>\Hermaphrodite</code>	➋	<code>\MALE</code>		
❼	<code>\FemaleFemale</code>	⩿	<code>\HERMAPHRODITE</code>	⩺	<code>\MaleMale</code>		

TABLE 378: `utfsym` Biological Symbols

❾	<code>\usym{26A2}</code>	❷	<code>\usym{26A4}</code>	❸	<code>\usym{26A6}</code>	❹	<code>\usym{26A8}</code>
❻	<code>\usym{26A3}</code>	❼	<code>\usym{26A5}</code>	❼	<code>\usym{26A7}</code>	❻	<code>\usym{26A9}</code>

All `utfsym` symbols are implemented with TikZ graphics, not with a font. In addition to `\usym`, the `utfsym` package defines `\usymH`, which renders a symbol at a given height, and `\usymW`, which renders a symbol at a given width. See the `utfsym` documentation for more information.

TABLE 379: `fontawesome5` Biological Symbols

❶	<code>\faGenderless</code>	❷	<code>\faMarsStrokeH</code>	❸	<code>\faTransgender</code>
❹	<code>\faMars</code>	❽	<code>\faMarsStrokeV</code>	❻	<code>\faVenus</code>
❼	<code>\faMarsDouble</code>	❼	<code>\faNeuter</code>	⩺	<code>\faVenusDouble</code>
⩿	<code>\faMarsStroke</code>	⩿	<code>\faTransgender*</code>	⩺	<code>\faVenusMars</code>

TABLE 380: `marvosym` Safety-related Symbols

❶	<code>\Biohazard</code>	❷	<code>\CEsign</code>	❸	<code>\Explosionsafe</code>	❹	<code>\Radioactivity</code>
⩿	<code>\BSEfree</code>	⩿	<code>\Estatically</code>	⩿	<code>\Laserbeam</code>	⩿	<code>\Stopsign</code>

TABLE 381: feyn Feynman Diagram Symbols

	\bigbosonloop		\hfermion		\smallbosonloopV
	\bigbosonloopA		\shfermion		\wfermion
	\bigbosonloopV		\smallbosonloop		\whfermion
	\gvcropped		\smallbosonloopA		
	\feyn{a}		\feyn{fu}		\feyn{gLS}
	\feyn{c}		\feyn{fv}		\feyn{glu}
	\feyn{f}		\feyn{g}		\feyn{gu}
	\feyn{fd}		\feyn{g1}		\feyn{gv}
	\feyn{fl}		\feyn{gd}		\feyn{gvs}
	\feyn{flS}		\feyn{gl}		\feyn{h}
	\feyn{fs}		\feyn{glB}		\feyn{hd}
					\feyn{x}

All other arguments to the \feyn command produce a “?” symbol.

The feyn package provides various commands for composing the preceding symbols into complete Feynman diagrams. See the feyn documentation for examples and additional information.

TABLE 382: svrsymbols Physics Ideograms

	\adsorbate		\experimental		\protein
	\adsorbent		\external		\proton
$\mu^+$	\antimuon		\fermiDistrib		\quadrupole
$\bar{\nu}$	\antineutrino		\fermion		\quark
$\bar{n}$	\antineutron		\Gluon		\quarkb
$p^-$	\antiproton		\graphene		\quarkc
$\bar{q}$	\antiquark		\graviton		\quarkd
$\bar{b}$	\antiquarkb		\hbond		\quarks
$\bar{c}$	\antiquarkc		\Higgsboson		\quarkt
$\bar{d}$	\antiquarkd		\hole		\quarku
$\bar{s}$	\antiquarks		\interaction		\reference
$\bar{t}$	\antiquarkt		\internal		\resistivity

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$\bar{u}$	<code>\antiquarku</code>	$\odot$	<code>\ion</code>	$\varrho^-$	<code>\rhomesonminus</code>
$\wedge$	<code>\anyon</code>	$\oplus$	<code>\ionicbond</code>	$\varrho^0$	<code>\rhomesonnull</code>
$\star$	<code>\assumption</code>	$\Psi$	<code>\Jpsimeson</code>	$\varrho^+$	<code>\rhomesonplus</code>
$\diamond$	<code>\atom</code>	$K^-$	<code>\Kaonminus</code>	$\boxplus$	<code>\solid</code>
$\star$	<code>\bigassumption</code>	$K^0$	<code>\Kaonnull</code>	$\boxtimes$	<code>\spin</code>
$\star\star$	<code>\Bigassumption</code>	$K^+$	<code>\Kaonplus</code>	$\boxdot$	<code>\spindown</code>
$\star\star$	<code>\biggassumption</code>	$\not\rightarrow$	<code>\magnon</code>	$\uparrow$	<code>\spinup</code>
$B^-$	<code>\Bmesonminus</code>	$\mathcal{M}$	<code>\maxwellDistrib</code>	$\wp$	<code>\surface</code>
$B^0$	<code>\Bmesonnull</code>	$\mathcal{M}$	<code>\metalbond</code>	$\mathbb{M}$	<code>\svrexample</code>
$B^+$	<code>\Bmesonplus</code>	$M$	<code>\method</code>	$f$	<code>\svrphoton</code>
$\rightarrow$	<code>\bond</code>	$\mu^-$	<code>\muon</code>	$t$	<code>\tachyon</code>
$\rangle$	<code>\boseDistrib</code>	$\nu$	<code>\neutrino</code>	$\tau^-$	<code>\tauleptonminus</code>
$\langle$	<code>\boson</code>	$n^0$	<code>\neutron</code>	$\tau^+$	<code>\tauleptonplus</code>
$\odot$	<code>\conductivity</code>	$\bullet\bullet$	<code>\nucleus</code>	$T^-$	<code>\Tmesonminus</code>
$\Lsh$	<code>\covbond</code>	$\curvearrowleft$	<code>\orbit</code>	$T^0$	<code>\Tmesonnull</code>
$d$	<code>\dipole</code>	$\phi$	<code>\phimeson</code>	$T^+$	<code>\Tmesonplus</code>
$D^-$	<code>\Dmesonminus</code>	$\phi^0$	<code>\phimesonnull</code>	$\not\llcorner$	<code>\triplecovbond</code>
$D^0$	<code>\Dmesonnull</code>	$F$	<code>\phonon</code>	$\gamma$	<code>\Upsilononmeson</code>
$D^+$	<code>\Dmesonplus</code>	$\pi^-$	<code>\pionminus</code>	$\mathfrak{T}$	<code>\varphoton</code>
$\not\llcorner$	<code>\doublecovbond</code>	$\pi^0$	<code>\pionnull</code>	$\bullet$	<code>\water</code>
$e^-$	<code>\electron</code>	$\pi^+$	<code>\pionplus</code>	$W$	<code>\Wboson</code>
$\Xi$	<code>\errorsym</code>	$\sim e$	<code>\plasmon</code>	$W^-$	<code>\Wbosonminus</code>
$\eta$	<code>\etameson</code>	$\mathfrak{x}$	<code>\polariton</code>	$W^+$	<code>\Wbosonplus</code>
$\eta'$	<code>\etamesonprime</code>	$\neg\not\llcorner$	<code>\polaron</code>	$Z$	<code>\Zboson</code>
$\neg h^+$	<code>\exciton</code>	$e^+$	<code>\positron</code>		

# Chapter 5

## Dingbats

Dingbats are symbols such as stars, arrows, and geometric shapes. They are commonly used as bullets in itemized lists or, more generally, as a means to draw attention to the text that follows.

The `pifont` dingbat package warrants special mention. Among other capabilities, `pifont` provides a L<sup>A</sup>T<sub>E</sub>X interface to the Zapf Dingbats font (one of the standard 35 PostScript fonts). However, rather than name each of the dingbats individually, `pifont` merely provides a single `\ding` command, which outputs the character that lies at a given position in the font. The consequence is that the `pifont` symbols can't be listed by name in this document's index, so be mindful of that fact when searching for a particular symbol.

TABLE 383: `bbding` Arrows

→	<code>\ArrowBoldDownRight</code>	♦	<code>\ArrowBoldRightShort</code>	↗	<code>\ArrowBoldUpRight</code>
↻	<code>\ArrowBoldRightCircled</code>	■■▶	<code>\ArrowBoldRightStrobe</code>		

TABLE 384: `pifont` Arrows

→	<code>\ding{212}</code>	→	<code>\ding{221}</code>	↗	<code>\ding{230}</code>	⇒	<code>\ding{239}</code>	↗	<code>\ding{249}</code>
→	<code>\ding{213}</code>	→	<code>\ding{222}</code>	▶	<code>\ding{231}</code>	⇒	<code>\ding{241}</code>	⇒	<code>\ding{250}</code>
↔	<code>\ding{214}</code>	→	<code>\ding{223}</code>	▶	<code>\ding{232}</code>	▷	<code>\ding{242}</code>	⇒	<code>\ding{251}</code>
↓	<code>\ding{215}</code>	→	<code>\ding{224}</code>	⇒	<code>\ding{233}</code>	▶▶	<code>\ding{243}</code>	⇒	<code>\ding{252}</code>
↖	<code>\ding{216}</code>	→	<code>\ding{225}</code>	⇒	<code>\ding{234}</code>	↘	<code>\ding{244}</code>	⇒	<code>\ding{253}</code>
→	<code>\ding{217}</code>	➢	<code>\ding{226}</code>	⇒	<code>\ding{235}</code>	⇒	<code>\ding{245}</code>	⇒	<code>\ding{254}</code>
↗	<code>\ding{218}</code>	➢	<code>\ding{227}</code>	⇒	<code>\ding{236}</code>	↗	<code>\ding{246}</code>		
→	<code>\ding{219}</code>	➢	<code>\ding{228}</code>	⇒	<code>\ding{237}</code>	↗	<code>\ding{247}</code>		
→	<code>\ding{220}</code>	➢	<code>\ding{229}</code>	⇒	<code>\ding{238}</code>	⇒	<code>\ding{248}</code>		

TABLE 385: adfsymbols Arrows

→	\adfarrows{1}	↗	\adfarrowsne{1}	↓	\adfarrows{2}	↙	\adfarrowsw{1}
→	\adfarrows{2}	↗	\adfarrowsne{2}	↓	\adfarrows{3}	↙	\adfarrowsw{2}
→	\adfarrows{3}	↗	\adfarrowsne{3}	↓	\adfarrows{4}	↙	\adfarrowsw{3}
→	\adfarrows{4}	↗	\adfarrowsne{4}	↓	\adfarrows{5}	↙	\adfarrowsw{4}
→	\adfarrows{5}	↗	\adfarrowsne{5}	↓	\adfarrows{6}	↙	\adfarrowsw{5}
→	\adfarrows{6}	↗	\adfarrowsne{6}	↓	\adfarrows{7}	↙	\adfarrowsw{6}
↑	\adfarrowsn{1}	↖	\adfarrowsnw{1}	↘	\adfarrowsse{1}	↔	\adarroww{1}
↑	\adfarrowsn{2}	↖	\adfarrowsnw{2}	↘	\adfarrowsse{2}	↔	\adarroww{2}
↑	\adfarrowsn{3}	↖	\adfarrowsnw{3}	↘	\adfarrowsse{3}	↔	\adarroww{3}
↑	\adfarrowsn{4}	↖	\adfarrowsnw{4}	↘	\adfarrowsse{4}	↔	\adarroww{4}
↑	\adfarrowsn{5}	↖	\adfarrowsnw{5}	↘	\adfarrowsse{5}	↔	\adarroww{5}
↑	\adfarrowsn{6}	↖	\adfarrowsnw{6}	↘	\adfarrowsse{6}	↔	\adarroww{6}
		⤒	\adhalfarrowleft		⤓	\adhalfarrowright	
		⤒	\adhalfarrowleftsolid		⤓	\adhalfarrowrightsolid	

Technically, the digit at the end of each `\adfarrows{<dir>}{<digit>}` command is a macro argument, not part of the command name.

The preceding symbols can also be produced by passing a number or a style/direction pair to the `\adfarrows` command. For example, both `\adfarrows{19}` and `\adfarrows[comic]{east}` produce “→”. See the `adfsymbols` documentation for more information.

TABLE 386: adforn Arrows

◀	\adhalfleftarrow	▶	\adhalfrightarrowhead
◀	\adhalfleftarrowhead	◀	\adleftarrowhead
▶	\adhalfrightarrow	▶	\adrightarrowhead

TABLE 387: arev Arrows

➤	\arrowbullet
---	--------------

TABLE 388: *utfsym* Arrows

→	\usym{2794}	➡	\usym{27A1}	↔	\usym{27AB}	↗	\usym{27B6}
↙	\usym{2798}	↘	\usym{27A2}	↔	\usym{27AC}	↖	\usym{27B7}
↗	\usym{2799}	↗	\usym{27A3}	▷	\usym{27AD}	➡	\usym{27B8}
↖	\usym{279A}	↗	\usym{27A4}	▷	\usym{27AE}	↗	\usym{27B9}
→	\usym{279B}	➡	\usym{27A5}	⇒	\usym{27AF}	→	\usym{27BA}
→	\usym{279C}	➡	\usym{27A6}	⇒	\usym{27B1}	⇒	\usym{27BB}
→	\usym{279D}	↑	\usym{27A7}	↶	\usym{27B2}	⇒	\usym{27BC}
→	\usym{279E}	➡	\usym{27A8}	⤠	\usym{27B3}	⇒	\usym{27BD}
⤠	\usym{279F}	⇒	\usym{27A9}	⤡	\usym{27B4}	⤠	\usym{27BE}
⤠	\usym{27A0}	⤡	\usym{27AA}	⤢	\usym{27B5}	⤢	

All *utfsym* symbols are implemented with TikZ graphics, not with a font. In addition to \usym, the *utfsym* package defines \usymH, which renders a symbol at a given height, and \usymW, which renders a symbol at a given width. See the *utfsym* documentation for more information.

TABLE 389: *asapsym* Arrows

⌚	\asapArrowCircleFillDown	⌚	\asapArrowCircleOpenRight
⌚	\asapArrowCircleFillDownLeft	⌚	\asapArrowCircleOpenUp
⌚	\asapArrowCircleFillDownRight	⌚	\asapArrowCircleOpenUpLeft
⌚	\asapArrowCircleFillLeft	⌚	\asapArrowCircleOpenUpRight
⌚	\asapArrowCircleFillRight	⌚	\asapArrowDown
⌚	\asapArrowCircleFillUp	⌚	\asapArrowDownLeft
⌚	\asapArrowCircleFillUpLeft	⌚	\asapArrowDownRight
⌚	\asapArrowCircleFillUpRight	⌚	\asapArrowLeft
⌚	\asapArrowCircleOpenDown	⌚	\asapArrowRight
⌚	\asapArrowCircleOpenDownLeft	⌚	\asapArrowUp
⌚	\asapArrowCircleOpenDownRight	⌚	\asapArrowUpLeft
⌚	\asapArrowCircleOpenLeft	⌚	\asapArrowUpRight

*asapsym* requires either *Lua<sup>T</sup>E<sub>X</sub>* or *X<sub>H</sub><sup>T</sup>E<sub>X</sub>*.

TABLE 390: typicons Arrows

◀ \tiArrowBack	↗ \tiArrowMaximise	▼ \tiArrowSortedDown
↖ \tiArrowBackOutline	↖ \tiArrowMaximiseOutline	▲ \tiArrowSortedUp
↓ \tiArrowDown	↘ \tiArrowMinimise	⌚ \tiArrowSync
⤵ \tiArrowDownOutline	⤵ \tiArrowMinimiseOutline	⌚ \tiArrowSyncOutline
⤴ \tiArrowDownThick	❖ \tiArrowMove	◆ \tiArrowUnsorted
⤶ \tiArrowForward	❖ \tiArrowMoveOutline	↑ \tiArrowUp
⤷ \tiArrowForwardOutline	❖ \tiArrowRepeat	⤷ \tiArrowUpOutline
⤸ \tiArrowLeft	⤸ \tiArrowRepeatOutline	⤸ \tiArrowUpThick
⤹ \tiArrowLeftOutline	⤸ \tiArrowRight	⤸ \tiLocationArrow
⤻ \tiArrowLeftThick	⤻ \tiArrowRightOutline	⤻ \tiLocationArrowOutline
⤼ \tiArrowLoop	⤼ \tiArrowRightThick	
⤽ \tiArrowLoopOutline	⤽ \tiArrowShuffle	

typicons requires either  $\text{Lua}\text{\texttt{ATEX}}$  or  $\text{Xe}\text{\texttt{ATEX}}$ .

TABLE 391: fontawesome5 Arrows

❶ \faArrowAltCircleDown[regular]	❷ \faArrowCircleDown	❸ \faArrowsAltV
❷ \faArrowAltCircleDown	❸ \faArrowCircleLeft	❹ \faArrowUp
❸ \faArrowAltCircleLeft[regular]	❹ \faArrowCircleRight	❺ \faLongArrowAltDown
❹ \faArrowAltCircleLeft	❺ \faArrowCircleUp	❻ \faLongArrowAltLeft
❺ \faArrowAltCircleRight	❻ \faArrowDown	❻ \faLongArrowAltRight
❻ \faArrowAltCircleRight[regular]	❻ \faArrowLeft	❻ \faLongArrowAltUp
❻ \faArrowAltCircleUp[regular]	❻ \faArrowRight	
❻ \faArrowAltCircleUp	❻ \faArrowsAltH	

TABLE 392: marvosym Scissors

✂ \CutLeft	---	✂ \CuttingLine	✂ \RightScissors
✂ \CutRight	✂	✂ \LeftScissors	

TABLE 393: bbdng Scissors

✂ \ScissorHollowLeft	✂ \ScissorLeftBrokenTop
✂ \ScissorHollowRight	✂ \ScissorRight
✂ \ScissorLeft	✂ \ScissorRightBrokenBottom
✂ \ScissorLeftBrokenBottom	✂ \ScissorRightBrokenTop

TABLE 394: pifont Scissors

✂ \ding{33}	✂ \ding{34}	✂ \ding{35}	✂ \ding{36}
-------------	-------------	-------------	-------------

TABLE 395: `utfsym` Scissors

	<code>\usym{2700}</code>		<code>\usym{2702}</code>		<code>\usym{2704}</code>
	<code>\usym{2701}</code>		<code>\usym{2703}</code>		

All `utfsym` symbols are implemented with TikZ graphics, not with a font. In addition to `\usym`, the `utfsym` package defines `\usymH`, which renders a symbol at a given height, and `\usymW`, which renders a symbol at a given width. See the `utfsym` documentation for more information.

TABLE 396: dingbat Pencils

	<code>\largepencil</code>		<code>\smallpencil</code>
---	---------------------------	---	---------------------------

TABLE 397: arev Pencils

	<code>\pencil</code>
---	----------------------

TABLE 398: typicons Pencils and Pens

	<code>\tiPen</code>		<code>\tiPencil</code>
---	---------------------	---	------------------------

`typicons` requires either `LuaATEX` or `XEATEX`.

TABLE 399: fontawesome5 Pencils, Pens, and Nibs

	<code>\faHighlighter</code>		<code>\faPen</code>		<code>\faPenNib</code>
	<code>\faMarker</code>		<code>\faPencil*</code>		<code>\faPenSquare</code>
	<code>\faPen*</code>		<code>\faPenFancy</code>		

TABLE 400: bbding Pencils and Nibs

	<code>\NibLeft</code>		<code>\PencilLeft</code>		<code>\PencilRightDown</code>
	<code>\NibRight</code>		<code>\PencilLeftDown</code>		<code>\PencilRightUp</code>
	<code>\NibSolidLeft</code>		<code>\PencilLeftUp</code>		
	<code>\NibSolidRight</code>		<code>\PencilRight</code>		

TABLE 401: pifont Pencils and Nibs

\ding{46} \ding{47} \ding{48} \ding{49} \ding{50}

TABLE 402: utfsym Pencils, Pens, and Nibs

\usym{270E}	\usym{2711}	\usym{1F58A}	\usym{1F58D}
\usym{270F}	\usym{2712}	\usym{1F58B}	
\usym{2710}	\usym{1F589}	\usym{1F58C}	

All `utsym` symbols are implemented with TikZ graphics, not with a font. In addition to `\usym`, the `utsym` package defines `\usymH`, which renders a symbol at a given height, and `\usymW`, which renders a symbol at a given width. See the `utsym` documentation for more information.

TABLE 403: dingbat Fists

\leftpointright	\rightpointleft	\rightpointright
\leftthumbsdown	\rightthumbsdown	
\leftthumbsup	\rightthumbsup	

TABLE 404: bbding Fists

\HandCuffLeft	\HandCuffRightUp	\HandPencilLeft
\HandCuffLeftUp	\HandLeft	\HandRight
\HandCuffRight	\HandLeftUp	\HandRightUp

TABLE 405: pifont Fists

\ding{42} \ding{43} \ding{44} \ding{45}

TABLE 406: fourier Fists

\lefthand \righthand

TABLE 407: arev Fists

\pointright

TABLE 408: *utfsym* Fists

	\usym{261A}		\usym{1F447}		\usym{1F58F}		\usym{1F59A}
	\usym{261B}		\usym{1F448}		\usym{1F590}		\usym{1F59B}
	\usym{261C}		\usym{1F449}		\usym{1F591}		\usym{1F59C}
	\usym{261D}		\usym{1F44A}		\usym{1F592}		\usym{1F59D}
	\usym{261E}		\usym{1F44B}		\usym{1F593}		\usym{1F59E}
	\usym{261F}		\usym{1F44C}		\usym{1F594}		\usym{1F59F}
	\usym{270A}		\usym{1F44D}		\usym{1F595}		\usym{1F5A0}
	\usym{270B}		\usym{1F44E}		\usym{1F596}		\usym{1F5A1}
	\usym{270C}		\usym{1F44F}		\usym{1F597}		\usym{1F5A2}
	\usym{270D}		\usym{1F450}		\usym{1F598}		\usym{1F5A3}
	\usym{1F446}		\usym{1F58E}		\usym{1F599}		

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TABLE 409: *typicons* Fists

\tiThumbsDown      \tiThumbsOk      \tiThumbsUp

*typicons* requires either *Lua<sup>E</sup>T<sub>E</sub>X* or *X<sub>H</sub><sup>E</sup>T<sub>E</sub>X*.

TABLE 410: fontawesome5 Fists

	\faFistRaised		\faHandPointUp
	\faHandHolding		\faHandPointUp[regular]
	\faHandHoldingHeart		\faHandRock
	\faHandHoldingMedical		\faHandRock[regular]
	\faHandHoldingUsd		\faHands
	\faHandHoldingWater		\faHandScissors
	\faHandLizard		\faHandScissors[regular]
	\faHandLizard[regular]		\faHandshake
	\faHandMiddleFinger		\faHandshake[regular]
	\faHandPaper		\faHandshakeAltSlash
	\faHandPaper[regular]		\faHandshakeSlash
	\faHandPeace		\faHandsHelping
	\faHandPeace[regular]		\faHandSparkles
	\faHandPointDown		\faHandSpock
	\faHandPointDown[regular]		\faHandSpock[regular]
	\faHandPointer		\faHandsWash
	\faHandPointer[regular]		\faThumbsDown
	\faHandPointLeft		\faThumbsDown[regular]
	\faHandPointLeft[regular]		\faThumbsUp
	\faHandPointRight		\faThumbsUp[regular]
	\faHandPointRight[regular]		

TABLE 411: bbdng Crosses and Plusses

	\Cross		\CrossOpenShadow		\PlusOutline
	\CrossBoldOutline		\CrossOutline		\PlusThinCenterOpen
	\CrossClowerTips		\Plus		
	\CrossMaltese		\PlusCenterOpen		

TABLE 412: pifont Crosses and Plusses

	\ding{57}		\ding{59}		\ding{61}		\ding{63}
	\ding{58}		\ding{60}		\ding{62}		\ding{64}

TABLE 413: adfsymbols Crosses and Plusses

	\adfbullet{4}		\adfbullet{6}		\adfbullet{8}		\adfbullet{10}
	\adfbullet{5}		\adfbullet{7}		\adfbullet{9}		

TABLE 414: `utfsym` Crosses and Plusses

$\oplus$	<code>\usym{2719}</code>	$\dagger$	<code>\usym{271D}</code>	$\oplus$	<code>\usym{2722}</code>	$\ddagger$	<code>\usym{1F546}</code>
$\oplus$	<code>\usym{271A}</code>	$\ddagger$	<code>\usym{271E}</code>	$\oplus$	<code>\usym{2723}</code>	$\ddagger$	<code>\usym{1F547}</code>
$\oplus$	<code>\usym{271B}</code>	$\dagger$	<code>\usym{271F}</code>	$\oplus$	<code>\usym{2724}</code>	$\ddagger$	<code>\usym{1F548}</code>
$\oplus$	<code>\usym{271C}</code>	$\times$	<code>\usym{2720}</code>	$\oplus$	<code>\usym{2725}</code>	$\ddagger$	<code>\usym{1F549}</code>

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TABLE 415: `arev` Crosses

$\dagger$  `\eastcross`    $\ddagger$  `\westcross`

TABLE 416: `bding` Xs and Check Marks

$\checkmark$	<code>\Checkmark</code>	$\times$	<code>\XSolid</code>	$\times$	<code>\XSolidBrush</code>
$\checkmark$	<code>\CheckmarkBold</code>	$\times$	<code>\XSolidBold</code>		

TABLE 417: `pifont` Xs and Check Marks

$\checkmark$	<code>\ding{51}</code>	$\times$	<code>\ding{53}</code>	$\times$	<code>\ding{55}</code>
$\checkmark$	<code>\ding{52}</code>	$\times$	<code>\ding{54}</code>	$\times$	<code>\ding{56}</code>

TABLE 418: `wasysym` Xs and Check Marks

$\square$  `\CheckedBox`    $\square$  `\Square`    $\square$  `\XBox`

TABLE 419: `marvosym` Xs and Check Marks

$\square$  `\Checkbox`    $\times$  `\CrossedBox*`    $\square$  `\HollowBox`

\* `marvosym` defines `\Crossedbox` as a synonym for `\CrossedBox`.

TABLE 420: `arev` Xs and Check Marks

$\checkmark$  `\ballotcheck`    $\times$  `\ballotx`

TABLE 421: `utfsym` Xs and Check Marks

<input type="checkbox"/>	<code>\usym{2610}</code>	<input checked="" type="checkbox"/>	<code>\usym{2713}</code>	<input checked="" type="checkbox"/>	<code>\usym{2718}</code>	<input checked="" type="checkbox"/>	<code>\usym{1F5F8}</code>
<input checked="" type="checkbox"/>	<code>\usym{2611}</code>	<input checked="" type="checkbox"/>	<code>\usym{2714}</code>	<input checked="" type="checkbox"/>	<code>\usym{1F5F4}</code>	<input checked="" type="checkbox"/>	<code>\usym{1F5F9}</code>
<input checked="" type="checkbox"/>	<code>\usym{2612}</code>	<input checked="" type="checkbox"/>	<code>\usym{2715}</code>	<input checked="" type="checkbox"/>	<code>\usym{1F5F5}</code>		
<input checked="" type="checkbox"/>	<code>\usym{2613}</code>	<input checked="" type="checkbox"/>	<code>\usym{2716}</code>	<input checked="" type="checkbox"/>	<code>\usym{1F5F6}</code>		
<input checked="" type="checkbox"/>	<code>\usym{2705}</code>	<input checked="" type="checkbox"/>	<code>\usym{2717}</code>	<input checked="" type="checkbox"/>	<code>\usym{1F5F7}</code>		

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TABLE 422: `typicons` Xs and Check Marks

<input checked="" type="checkbox"/>	<code>\tiDelete</code>	<input checked="" type="checkbox"/>	<code>\tiInputCheckedOutline</code>	<input checked="" type="checkbox"/>	<code>\tiTimes</code>
<input checked="" type="checkbox"/>	<code>\tiDeleteOutline</code>	<input checked="" type="checkbox"/>	<code>\tiTick</code>		<code>\tiTimesOutline</code>
<input checked="" type="checkbox"/>	<code>\tiInputChecked</code>	<input checked="" type="checkbox"/>	<code>\tiTickOutline</code>		

`typicons` requires either `LuaLaTeX` or `XeLaTeX`.

TABLE 423: `fontawesome5` Xs and Check Marks

<input checked="" type="checkbox"/>	<code>\faCheck</code>	<input checked="" type="checkbox"/>	<code>\faCheckSquare[regular]</code>
<input checked="" type="checkbox"/>	<code>\faCheckCircle</code>	<input checked="" type="checkbox"/>	<code>\faTimes</code>
<input checked="" type="checkbox"/>	<code>\faCheckCircle[regular]</code>	<input checked="" type="checkbox"/>	<code>\faTimesCircle</code>
<input checked="" type="checkbox"/>	<code>\faCheckDouble</code>	<input checked="" type="checkbox"/>	<code>\faTimesCircle[regular]</code>
<input checked="" type="checkbox"/>	<code>\faCheckSquare</code>		

TABLE 424: `pifont` Circled Numerals

①	<code>\ding{172}</code>	①	<code>\ding{182}</code>	①	<code>\ding{192}</code>	①	<code>\ding{202}</code>
②	<code>\ding{173}</code>	②	<code>\ding{183}</code>	②	<code>\ding{193}</code>	②	<code>\ding{203}</code>
③	<code>\ding{174}</code>	③	<code>\ding{184}</code>	③	<code>\ding{194}</code>	③	<code>\ding{204}</code>
④	<code>\ding{175}</code>	④	<code>\ding{185}</code>	④	<code>\ding{195}</code>	④	<code>\ding{205}</code>
⑤	<code>\ding{176}</code>	⑤	<code>\ding{186}</code>	⑤	<code>\ding{196}</code>	⑤	<code>\ding{206}</code>
⑥	<code>\ding{177}</code>	⑥	<code>\ding{187}</code>	⑥	<code>\ding{197}</code>	⑥	<code>\ding{207}</code>
⑦	<code>\ding{178}</code>	⑦	<code>\ding{188}</code>	⑦	<code>\ding{198}</code>	⑦	<code>\ding{208}</code>
⑧	<code>\ding{179}</code>	⑧	<code>\ding{189}</code>	⑧	<code>\ding{199}</code>	⑧	<code>\ding{209}</code>
⑨	<code>\ding{180}</code>	⑨	<code>\ding{190}</code>	⑨	<code>\ding{200}</code>	⑨	<code>\ding{210}</code>
⑩	<code>\ding{181}</code>	⑩	<code>\ding{191}</code>	⑩	<code>\ding{201}</code>	⑩	<code>\ding{211}</code>

`pifont` (part of the `psnfss` package) provides a `dingautolist` environment which resembles `enumerate` but uses circled numbers as bullets.<sup>1</sup> See the `psnfss` documentation for more information.

TABLE 425: `utfsym` Circled Numerals

❶	<code>\usym{2776}</code>	❹	<code>\usym{277E}</code>	❷	<code>\usym{2786}</code>	❽	<code>\usym{278E}</code>
❷	<code>\usym{2777}</code>	❺	<code>\usym{277F}</code>	❸	<code>\usym{2787}</code>	❾	<code>\usym{278F}</code>
❸	<code>\usym{2778}</code>	❻	<code>\usym{2780}</code>	❹	<code>\usym{2788}</code>	❿	<code>\usym{2790}</code>
❹	<code>\usym{2779}</code>	❻	<code>\usym{2781}</code>	❺	<code>\usym{2789}</code>	❻	<code>\usym{2791}</code>
❺	<code>\usym{277A}</code>	❻	<code>\usym{2782}</code>	❻	<code>\usym{278A}</code>	❻	<code>\usym{2792}</code>
❻	<code>\usym{277B}</code>	❻	<code>\usym{2783}</code>	❻	<code>\usym{278B}</code>	❻	<code>\usym{2793}</code>
❻	<code>\usym{277C}</code>	❻	<code>\usym{2784}</code>	❻	<code>\usym{278C}</code>		
❻	<code>\usym{277D}</code>	❻	<code>\usym{2785}</code>	❻	<code>\usym{278D}</code>		

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TABLE 426: `wasymsym` Stars

$\diamond$  `\davidsstar` \* `\hexstar` \* `\varhexstar`

TABLE 427: `bding` Stars, Flowers, and Similar Shapes

*	<code>\Asterisk</code>	❖	<code>\FiveFlowerPetal</code>	+	<code>\JackStar</code>
**	<code>\AsteriskBold</code>	★	<code>\FiveStar</code>	◆	<code>\JackStarBold</code>
*%	<code>\AsteriskCenterOpen</code>	☆	<code>\FiveStarCenterOpen</code>	✿	<code>\SixFlowerAlternate</code>
*%	<code>\AsteriskRoundedEnds</code>	☆	<code>\FiveStarConvex</code>	✿	<code>\SixFlowerAltPetal</code>
*	<code>\AsteriskThin</code>	☆	<code>\FiveStarLines</code>	✿	<code>\SixFlowerOpenCenter</code>
*	<code>\AsteriskThinCenterOpen</code>	☆	<code>\FiveStarOpen</code>	✿	<code>\SixFlowerPetalDotted</code>
◊	<code>\DavidStar</code>	◐	<code>\FiveStarOpenCircled</code>	✿	<code>\SixFlowerPetalRemoved</code>
★	<code>\DavidStarSolid</code>	★	<code>\FiveStarOpenDotted</code>	✿	<code>\SixFlowerRemovedOpenPetal</code>
*	<code>\EightAsterisk</code>	★	<code>\FiveStarOutline</code>	★	<code>\SixStar</code>
❖	<code>\EightFlowerPetal</code>	★	<code>\FiveStarOutlineHeavy</code>	✿	<code>\SixteenStarLight</code>
*	<code>\EightFlowerPetalRemoved</code>	★	<code>\FiveStarShadow</code>	✿	<code>\Snowflake</code>
*	<code>\EightStar</code>	+	<code>\FourAsterisk</code>	✿	<code>\SnowflakeChevron</code>
★	<code>\EightStarBold</code>	❖	<code>\FourClowerOpen</code>	✿	<code>\SnowflakeChevronBold</code>
*	<code>\EightStarConvex</code>	❖	<code>\FourClowerSolid</code>	✿	<code>\Sparkle</code>
*	<code>\EightStarTaper</code>	◆	<code>\FourStar</code>	✿	<code>\SparkleBold</code>
❖	<code>\FiveFlowerOpen</code>	❖	<code>\FourStarOpen</code>	✿	<code>\TwelveStar</code>

<sup>1</sup>In fact, `dingautolist` can use any set of consecutive Zapf Dingbats symbols.

TABLE 428: pifont Stars, Flowers, and Similar Shapes

◊	\ding{65}	★	\ding{74}	*	\ding{83}	*	\ding{92}	*	\ding{101}
+	\ding{66}	☆	\ding{75}	*	\ding{84}	*	\ding{93}	*	\ding{102}
✧	\ding{67}	★	\ding{76}	*	\ding{85}	*	\ding{94}	*	\ding{103}
❖	\ding{68}	★	\ding{77}	*	\ding{86}	❖	\ding{95}	*	\ding{104}
❖	\ding{69}	★	\ding{78}	*	\ding{87}	❖	\ding{96}	*	\ding{105}
◆	\ding{70}	★	\ding{79}	*	\ding{88}	❖	\ding{97}	*	\ding{106}
❖	\ding{71}	☆	\ding{80}	*	\ding{89}	❖	\ding{98}	*	\ding{107}
★	\ding{72}	*	\ding{81}	*	\ding{90}	*	\ding{99}		
☆	\ding{73}	*	\ding{82}	*	\ding{91}	*	\ding{100}		

TABLE 429: adfsymbols Stars, Flowers, and Similar Shapes

◊	\adfbullet{1}	*	\adfbullet{13}	◊	\adfbullet{18}	◊	\adfbullet{23}
◊	\adfbullet{2}	◊	\adfbullet{14}	◊	\adfbullet{19}	◊	\adfbullet{24}
*	\adfbullet{3}	*	\adfbullet{15}	◦	\adfbullet{20}	*	\adfbullet{25}
*	\adfbullet{11}	*	\adfbullet{16}	*	\adfbullet{21}	*	\adfbullet{26}
*	\adfbullet{12}	*	\adfbullet{17}	*	\adfbullet{22}		

TABLE 430: utfsym Stars, Flowers, and Similar Shapes

★	\usym{2605}	★	\usym{272B}	*	\usym{2737}	*	\usym{2743}
★	\usym{2606}	★	\usym{272C}	*	\usym{2738}	*	\usym{2744}
★	\usym{26E4}	★	\usym{272D}	*	\usym{2739}	*	\usym{2745}
★	\usym{26E5}	★	\usym{272E}	*	\usym{273A}	*	\usym{2746}
★	\usym{26E6}	★	\usym{272F}	*	\usym{273B}	*	\usym{2747}
★	\usym{26E7}	★	\usym{2730}	*	\usym{273C}	*	\usym{2748}
◊	\usym{2721}	*	\usym{2731}	*	\usym{273D}	*	\usym{2749}
◆	\usym{2726}	*	\usym{2732}	*	\usym{273E}	*	\usym{274A}
❖	\usym{2727}	*	\usym{2733}	❖	\usym{273F}	*	\usym{274B}
❖	\usym{2728}	*	\usym{2734}	❖	\usym{2740}	*	\usym{1F52F}
★	\usym{2729}	*	\usym{2735}	*	\usym{2741}		
★	\usym{272A}	*	\usym{2736}	*	\usym{2742}		

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TABLE 431: adforn Stars

*	\adfast{1}	*	\adfast{3}	*	\adfast{5}	*	\adfast{7}	*	\adfast{9}
*	\adfast{2}	*	\adfast{4}	*	\adfast{6}	*	\adfast{8}	*	\adfast{10}

TABLE 432: typicons Stars

★ \tiStar	★ \tiStarFullOutline	☆ \tiStarOutline
● \tiStarburst	■ \tiStarHalf	
○ \tiStarburstOutline	☆ \tiStarHalfOutline	

typicons requires either  $\text{Lua}\text{\LaTeX}$  or  $\text{Xe}\text{\LaTeX}$ .

TABLE 433: fontawesome5 Stars

★ \faStar	★ \faStarHalf*	★ \faStarHalf[regular]
☆ \faStar[regular]	■ \faStarHalf	＊ \faStarOfLife

TABLE 434: fourier Fleurons and Flowers

⌚ \aldine	❖ \decoone	⌚ \floweroneright
⌚ \aldineleft	❖ \decosix	⌚ \leafleft
⌚ \aldineright	❖ \decothreeleft	⌚ \leafNE
⌚ \aldinesmall	❖ \decothreeright	⌚ \leafright
⌚ \decofourleft	❖ \decotwo	+ \starredbullet
⌚ \decofourright	⌚ \floweroneleft	

TABLE 435: adforn Fleurons and Flowers

⌚ \adfdownhalfleafleft	⌚ \adfdownhalfleafright
⌚ \adfdownleafleft	⌚ \adfdownleafright
⌚ \adfflatdownhalfleafleft	⌚ \adfflatdownhalfleafright
⌚ \adfflatdownoutlineleafleft	⌚ \adfflatdownoutlineleafright
⌚ \adfflatleafleft	⌚ \adfflatleafright
⌚ \adfflatleafoutlineleft	⌚ \adfflatleaflineright
⌚ \adfflatleafsolidleft	⌚ \adfflatleafsolidright
⌚ \adfflowerleft	⌚ \adfflowerright
⌚ \adfhalfleafleft	⌚ \adfhalfleafright
⌚ \adfhangingflatleafleft	⌚ \adfhangingflatleafright
⌚ \adfhangingingleafleft	⌚ \adfhangingingleafright
⌚ \adfleafleft	⌚ \adfleafright
⌚ \adfoutlineleafleft	⌚ \adfoutlineleafright
⌚ \adfsmallhangingleafleft	⌚ \adfsmallhangingleafright
⌚ \adfsmallleafleft	⌚ \adfsmallleafright
⌚ \adfsolidleafleft	⌚ \adfsolidleafright

TABLE 436: wasysym Geometric Shapes

○	\Circle	●	\LEFTcircle	○	\octagon	●	\RIGHTcircle
●	\CIRCLE	●	\LEFTCIRCLE	○	\pentagon	●	\RIGHTCIRCLE
○	\hexagon	○	\Leftcircle	○	\Rightcircle	○	\varhexagon

TABLE 437: MnSymbol Geometric Shapes

★	\filledlargestar	◊	\largeLozenge	◊	\medLozenge
◆	\filledLozenge	☆	\largePentagram	◊	\medStarofdavid
◆	\filledmedLozenge	□	\largeSquare	◊	\smallLozenge
○	\largecircle	☆	\largeStar		
◇	\largeDiamond	☆	\largeStarofdavid		

MnSymbol defines \bigcirc as a synonym for \largecircle; \bigstar as a synonym for \filledlargestar; \lozenge as a synonym for \medLozenge; and, \blacklozenge as a synonym for \filledmedLozenge.

TABLE 438: fdsymbol Geometric Shapes

●	\largeblackcircle	▽	\largeangledown	◊	\medLozenge
■	\largeblacksquare	△	\largeangleup	♦	\smallblackLozenge
★	\largeblackstar	☆	\largewhitestar	◊	\smallLozenge
○	\largecircle	◊	\lozengeminus	◊	\starofdavid
□	\largeSquare	♦	\medblackLozenge		

fdsymbol defines synonyms for almost all of the preceding symbols:

○	\bigcirc	■	\lgblksquare	◊	\mdlgwhtLozenge
★	\bigstar	○	\lgwhtcircle	◊	\mdwhtLozenge
▽	\bigangledown	□	\lgwhtsquare	♦	\smbblkLozenge
△	\bigangleup	◊	\lozenge	◊	\smwhtLozenge
♦	\blackLozenge	♦	\mdblkLozenge		
●	\lgblkcircle	♦	\mdlblkLozenge		

TABLE 439: boisik Geometric Shapes

★	\bigstar	◊	\diamond	▽	\angledown
◆	\blackLozenge	◊	\lozenge	◀	\triangleleft
■	\blacksquare	◊	\lozengeDot	▷	\triangleright
▲	\blacktriangle	□	\square	△	\varlrttriangle
▼	\blackangledown	*	\star		

TABLE 440: stix Geometric Shapes

○	\acwopencirclearrow	○	\enclosecircle	◆	\smblkdiamond
↖	\barovernorthwestarrow	◇	\enclosediamond	♦	\smblklozenge
◎	\benzren	□	\enclosesquare	■	\smblksquare
▼	\bigblacktriangledown	△	\enclosetriangle	☆	\smwhitestar
▲	\bigblacktriangleup	●	\errbarblackcircle	○	\smwhtcircle
★	\bigstar	◆	\errbarblackdiamond	◊	\smwhtdiamond
▽	\bigtriangledown	■	\errbarblacksquare	◊	\smwhtlozenge
◀	\bigtriangleleft	○	\errbarcircle	□	\smwhtsquare
△	\bigtriangleup	◊	\errbardiamond	□	\sqlozenge
☆	\bigwhitestar	□	\errbarsquare	■	\squarebotblack
●	\blackcircledownarrow	○	\fisheye	▨	\squarecrossfill
●	\blackcircledrightdot	□	\fltns	▨	\squarehfill
●	\blackcircledtwodots	○	\hexagon	▨	\squarehfill
●	\blackcircleulquadwhite	◆	\hexagonblack	■	\squareleftblack
◆	\blackdiamondddownarrow	▷	\house	▨	\squarellblack
◆	\blackinwhitediamond	□	\hrectangle	▨	\squarellquad
▣	\blackinwhitesquare	■	\hrectangleblack	▨	\squarelrblack
◐	\blacklefthalfcircle	○	\inversewhitecircle	▨	\squarelrquad
◀	\blackpointerleft	□	\invwhitehalfcircle	▨	\squareneswfill
▶	\blackpointerright	□	\invwhiteupperhalfcircle	▨	\squarensewfill
▷	\blackrighthalfcircle	●	\lgbblkcircle	■	\siquerightblack
▲	\blacktriangle	■	\lgblksquare	■	\squaretopblack
▼	\blacktriangledown	○	\lgwhtcircle	■	\squareulblack
◀	\blacktriangleleft	□	\lgwhtsquare	□	\squareulquad
▶	\blacktriangleright	▼	\llblacktriangle	□	\squareurblack
●	\blkhorzoval	▷	\lltriangle	□	\squareurquad
●	\blkvertoval	◀	\lrblacktriangle	▨	\squarevfill
○	\botsemicircle	▷	\lrtriangle	○	\squaoval
▣	\boxonbox	●	\mdbblkcircle	○	\topsemicircle
◎	\bullseye	◆	\mdblkdiamond	□	\trapezium
○	\circ	◆	\mdblklozenge	△	\trianglecdot
●	\circlebottomhalfblack	■	\mdblksquare	▽	\triangledown
●	\circledbullet	●	\mdlgbblkcircle	▲	\triangleleftblack
♀	\circledownarrow	◆	\mdlgbldiamond	▲	\triangleodot
○	\circledrightdot	◆	\mdlgbblklozenge	▲	\trianglerightblack
✿	\circledstar	■	\mdlgbblksquare	△	\triangles
○	\circledtwodots	◊	\mdlgwhtdiamond	△	\triangleubar
○	\circledwhitebullet	◊	\mdlgwhtlozenge	◀	\ulblacktriangle
○	\circlelefthalfblack	□	\mdlgwhtsquare	▷	\ultriangle
○	\circlellquad	●	\mdsmbblkcircle	◊	\uparrowarrowoncircle
○	\circlelrquad	■	\mdsmbblksquare	◀	\urblacktriangle
●	\circlerighthalfblack	○	\mdsmwhtcircle	▷	\urtriangle
○	\circletophalfblack	□	\mdsmwhtsquare	○	\varhexagon

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⊖	\circleulquad	○	\mdwhtcircle	⬢	\varhexagonblack
⊖	\circleurquad	◊	\mdwdiamond	⬡	\varhexagonrbonds
◐	\circleurquadblack	◊	\mdwhtlozenge	△	\varltriangle
◑	\circlevertfill	□	\mdwhtsquare	*	\varstar
○-	\cirE	★	\medblackstar	◀	\vartriangleleft
○○	\cirs cir	☆	\medwhitestar	▶	\vartriangleright
○○	\cwopencirclearrow	□□	\parallelogram	□	\vrectangle
◆	\diamondbotblack	■■	\parallelogramblack	■	\vrectangleblack
◆	\diamondcdot	◇	\pentagon	·	\vysmblksquare
◆	\diamondleftblack	◆	\pentagonblack	·	\vysmwhtsquare
◆	\diamondrightblack	◇	\rightpentagon	▲	\whiteinwhitetriangle
◆	\diamondtopblack	◆	\rightpentagonblack	◀	\whitepointerleft
○○	\dottedcircle	◀	\smallblacktriangleleft	▶	\whitepointerright
□□	\dottedsquare	▶	\smallblacktriangleright	○	\whthorzoval
▼▼	\downtriangleleftblack	◀	\smalltriangleleft	○	\whtvertoval
▼▼	\downtrianglerightblack	▶	\smalltriangleright		

stix defines \diamond as a synonym for \smwhtdiamond, \blacksquare as a synonym for \mdlgbksquare, \square and \Box as synonyms for \mdlgwtsquare, \triangle and \varbigtriangleup as synonyms for \bigtriangleup, \rhd as a synonym for \vartriangleright, \varbigtriangledown as a synonym for \bigtriangledown, \lhd as a synonym for \vartriangleleft, \Diamond and \lozenge as synonyms for \mdlgwhtlozenge, \bigcirc as a synonym for \mdlgwhtcircle, \circ as a synonym for \smwhtcircle, and \blacklozenge as a synonym for \mdlgbklozenge.

TABLE 441: ifsym Geometric Shapes

○	\BigCircle	►	\FilledBigTriangleRight	○	\SmallCircle
×	\BigCross	▲	\FilledBigTriangleUp	×	\SmallCross
◇	\BigDiamondshape	●	\FilledCircle	◊	\SmallDiamondshape
—	\BigHBar	◆	\FilledDiamondShadowA	—	\SmallHBar
◆	\BigLowerDiamond	◆	\FilledDiamondShadowC	◆	\SmallLowerDiamond
◆	\BigRightDiamond	◆	\FilledDiamondshape	◆	\SmallRightDiamond
□	\BigSquare	●	\FilledSmallCircle	□	\SmallSquare
▽	\BigTriangleDown	◆	\FilledSmallDiamondshape	▽	\SmallTriangleDown
◀	\BigTriangleLeft	■	\FilledSmallSquare	◀	\SmallTriangleLeft
▶	\BigTriangleRight	▼	\FilledSmallTriangleDown	▶	\SmallTriangleRight
△	\BigTriangleUp	◀	\FilledSmallTriangleLeft	△	\SmallTriangleUp

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	\BigVBar	▶	\FilledSmallTriangleRight		\SmallVBar
○	\Circle	▲	\FilledSmallTriangleUp	↓	\SpinDown
×	\Cross	■	\FilledSquare	↑	\SpinUp
◊	\DiamondShadowA	■	\FilledSquareShadowA	□	\Square
◊	\DiamondShadowB	■	\FilledSquareShadowC	□	\SquareShadowA
◊	\DiamondShadowC	▼	\FilledTriangleDown	■	\SquareShadowB
◊	\Diamondshape	◀	\FilledTriangleLeft	□	\SquareShadowC
●	\FilledBigCircle	▶	\FilledTriangleRight	▽	\TriangleDown
◆	\FilledBigDiamondshape	▲	\FilledTriangleUp	◀	\TriangleLeft
■	\FilledBigSquare	—	\HBar	▷	\TriangleRight
▼	\FilledBigTriangleDown	◆	\LowerDiamond	△	\TriangleUp
◀	\FilledBigTriangleLeft	♦	\RightDiamond		\VBar

The ifsym documentation points out that one can use \rlap to combine some of the above into useful, new symbols. For example, \BigCircle and \FilledSmallCircle combine to give “●”. Likewise, \Square and \Cross combine to give “×”. See Section 12.3 for more information about constructing new symbols out of existing symbols.

TABLE 442: bbdng Geometric Shapes

○	\CircleShadow	█	\Rectangle	□	\SquareShadowTopLeft
●	\CircleSolid	█	\RectangleBold	□	\SquareShadowTopRight
◆	\DiamondSolid	█	\RectangleThin	█	\SquareSolid
○	\Ellipse	□	\Square	▼	\TriangleDown
○	\EllipseShadow	□	\SquareCastShadowBottomRight	▲	\TriangleUp
●	\EllipseSolid	□	\SquareCastShadowTopLeft		
●	\HalfCircleLeft	□	\SquareCastShadowTopRight		
●	\HalfCircleRight	□	\SquareShadowBottomRight		

TABLE 443: pifont Geometric Shapes

●	\ding{108}	□	\ding{111}	□	\ding{114}	◆	\ding{117}		\ding{121}
○	\ding{109}	□	\ding{112}	▲	\ding{115}	▷	\ding{119}	▀	\ding{122}
■	\ding{110}	□	\ding{113}	▼	\ding{116}		\ding{120}		

TABLE 444: universa Geometric Shapes

● \baucircle ■ \lausquare ▲ \bautriangle

TABLE 445: `adfsymbols` Geometric Shapes

•	\adfbullet{27}	►	\adfbullet{32}	•	\adfbullet{43}	♦	\adfbullet{48}
•	\adfbullet{28}	▲	\adfbullet{33}	•	\adfbullet{44}	♦	\adfbullet{49}
■	\adfbullet{29}	▼	\adfbullet{34}	◦	\adfbullet{45}	♦	\adfbullet{50}
◆	\adfbullet{30}	•	\adfbullet{41}	▪	\adfbullet{46}	◊	\adfbullet{51}
◀	\adfbullet{31}	•	\adfbullet{42}	▪	\adfbullet{47}	◦	\adfbullet{52}

TABLE 446: `utfsym` Geometric Shapes

●	\usym{1F534}	◆	\usym{1F537}	▲	\usym{1F53A}	▼	\usym{1F53D}
●	\usym{1F535}	◆	\usym{1F538}	▼	\usym{1F53B}		
◆	\usym{1F536}	◆	\usym{1F539}	▲	\usym{1F53C}		

All `utfsym` symbols are implemented with TikZ graphics, not with a font. In addition to `\usym`, the `utfsym` package defines `\usymH`, which renders a symbol at a given height, and `\usymW`, which renders a symbol at a given width. See the `utfsym` documentation for more information.

TABLE 447: `fontawesome5` Geometric Shapes

●	\faCircle	●	\faDotCircle	□	\faSquare[regular]
○	\faCircle[regular]	○	\faDotCircle[regular]	■	\faSquareFull
○	\faCircleNotch	■	\faSquare		

TABLE 448: `oplotstsymbl` Geometric Shapes

○	\circlet	◆	\rhombusfillha	△	\trianglepalineh
⊗	\circletcross	◆	\rhombusfillhb	△	\trianglepalinev
○	\circleddot	◆	\rhombusfillhl	△	\trianglepalinevh
●	\circletfill	◆	\rhombusfillhr	▽	\trianglelpb
○	\circletfillha	◆	\rhombuslineh	☒	\trianglelpbcross
●	\circletfillhb	◆	\rhombuslinev	▽	\trianglelpbdot
○	\circletfillhl	◆	\rhombuslinevh	▼	\trianglelpbfill
●	\circletfillhr	□	\squad	▽	\trianglelpbfillha
⊖	\circletpath	☒	\squadcross	▼	\trianglelpbfillhb
○	\circletpathv	□	\squaddot	▼	\trianglelpbfillhl
⊕	\circletpathvh	■	\squadfill	▼	\trianglelpbfillhr

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○	\hexago	■	\squadfillha	▽	\trianglepblineh
⊗	\hexagocross	■	\squadfillhb	▽	\trianglepblinev
◊	\hexagodot	■	\squadfillhl	▽	\trianglepblinevh
◆	\hexagofill	■	\squadfillhr	▷	\trianglepl
◆	\hexagofillha	□	\squadlineh	☒	\triangleplcross
◆	\hexagofillhb	□	\squadlinev	☒	\trianglepldot
◆	\hexagofillhl	□	\squadlinevh	◀	\triangleplfill
◆	\hexagofillhr	☆	\starlet	◀	\triangleplfillha
◊	\hexagolineh	☒	\starletcross	◀	\triangleplfillhb
◊	\hexagolinev	☒	\starletdot	◀	\triangleplfillhl
⊕	\hexagolinevh	★	\starletfill	◀	\triangleplfillhr
◇	\pentago	★	\starletfillha	▷	\trianglepllineh
⊗	\pentagocross	★	\starletfillhb	▷	\trianglepllinev
◊	\pentagodot	★	\starletfillhl	◀	\trianglepllinevh
◆	\pentagofill	★	\starletfillhr	▷	\trianglepr
◆	\pentagofillha	★	\starletlineh	☒	\triangleprcross
◆	\pentagofillhb	★	\starletlinev	▷	\triangleprdot
◆	\pentagofillhl	★	\starletlinevh	▶	\triangleprfill
◆	\pentagofillhr	△	\trianglepa	▶	\triangleprfillha
◊	\pentagolineh	☒	\trianglepacross	▶	\triangleprfillhb
◊	\pentagolinev	△	\trianglepadot	▶	\triangleprfillhl
⊕	\pentagolinevh	▲	\trianglepafill	▶	\triangleprfillhr
◇	\rhombus	△	\trianglepafillha	▷	\triangleprlineh
⊗	\rhombuscross	▲	\trianglepafillhb	▷	\triangleprlinev
◊	\rhombusdot	△	\trianglepafillhl	▷	\triangleprlinevh
◆	\rhombusfill	▲	\trianglepafillhr	▷	

“fillha”, “fillhb”, “fillhl”, and “fillhr”, imply, respectively, “half-filled above”, “half-filled below”, “half-filled left”, and “half-filled right”. In the `\triangle...` symbols, “pa”, “pb”, “pr”, and “pl” refer respectively to “peak above”, “peak below”, “peak left”, and “peak right”.

All `oplotsymb` symbols are implemented with TikZ graphics, not with a font.

TABLE 449: adforn Flourishes

~	\adfclosedflourishleft	~	\adfclosedflourishright
~~	\adfdoubleflourishleft	~~	\adfdoubleflourishright
~~	\adfdoublesharpflourishleft	~~	\adfdoublesharpflourishright
~	\adfflourishleft	~	\adfflourishright
~~	\adfflourishleftdouble	~~	\adfflourishrightdouble
~	\adfopenflourishleft	~	\adfopenflourishright
—	\adfsharpflourishleft	—	\adfsharpflourishright
~~	\adfsickleflourishleft	~~	\adfsickleflourishright
~	\adfsingleflourishleft	~	\adfsingleflourishright
~~	\adftripleflourishleft	~~	\adftripleflourishright
~~	\adfwavesleft	~~	\adfwavesright

TABLE 450: Miscellaneous `oplotsymb1` Symbols

— `\lineh` | `\linev` + `\linevh` X `\scross` \* `\scrossvh`

All `oplotsymb1` symbols are implemented with TikZ graphics, not with a font.

TABLE 451: Miscellaneous dingbat Dingbats

	<code>\anchor</code>		<code>\eye</code>		<code>\Sborder</code>
	<code>\carriagereturn</code>		<code>\filledsquarewithdots</code>		<code>\squarewithdots</code>
	<code>\checkmark</code>		<code>\satellitedish</code>		<code>\Zborder</code>

TABLE 452: Miscellaneous bbdng Dingbats

	<code>\Envelope</code>		<code>\Peace</code>		<code>\PhoneHandset</code>		<code>\SunshineOpenCircled</code>
	<code>\OrnamentDiamondSolid</code>		<code>\Phone</code>		<code>\Plane</code>		<code>\Tape</code>

TABLE 453: Miscellaneous pifont Dingbats

	<code>\ding{37}</code>		<code>\ding{40}</code>		<code>\ding{164}</code>		<code>\ding{167}</code>		<code>\ding{171}</code>
	<code>\ding{38}</code>		<code>\ding{41}</code>		<code>\ding{165}</code>		<code>\ding{168}</code>		<code>\ding{169}</code>
	<code>\ding{39}</code>		<code>\ding{118}</code>		<code>\ding{166}</code>		<code>\ding{170}</code>		

TABLE 454: Miscellaneous adforn Dingbats

• `\adfbullet` ◊ `\adfdiamond` ⚡ `\adfgee` § `\adfS` □ `\adfsquare`

TABLE 455: Miscellaneous `utfsym` Dingbats

⌚	<code>\usym{2706}</code>	!	<code>\usym{2755}</code>	⌚	<code>\usym{2762}</code>	>	<code>\usym{276F}</code>
⌚	<code>\usym{2707}</code>	❖	<code>\usym{2756}</code>	⌚	<code>\usym{2763}</code>	(	<code>\usym{2770}</code>
✈	<code>\usym{2708}</code>	!	<code>\usym{2757}</code>	⌚	<code>\usym{2764}</code>	)	<code>\usym{2771}</code>
✉	<code>\usym{2709}</code>		<code>\usym{2758}</code>	⌚	<code>\usym{2765}</code>	{	<code>\usym{2772}</code>
✖	<code>\usym{274C}</code>		<code>\usym{2759}</code>	⌚	<code>\usym{2766}</code>	}	<code>\usym{2773}</code>
○	<code>\usym{274D}</code>	■	<code>\usym{275A}</code>	⌚	<code>\usym{2767}</code>	{	<code>\usym{2774}</code>
✖	<code>\usym{274E}</code>	❶	<code>\usym{275B}</code>	(	<code>\usym{2768}</code>	}	<code>\usym{2775}</code>
□	<code>\usym{274F}</code>	❷	<code>\usym{275C}</code>	)	<code>\usym{2769}</code>	+	<code>\usym{2795}</code>
□	<code>\usym{2750}</code>	❸	<code>\usym{275D}</code>	(	<code>\usym{276A}</code>	-	<code>\usym{2796}</code>
□	<code>\usym{2751}</code>	❹	<code>\usym{275E}</code>	)	<code>\usym{276B}</code>	÷	<code>\usym{2797}</code>
□	<code>\usym{2752}</code>	❺	<code>\usym{275F}</code>	(	<code>\usym{276C}</code>	⌚	<code>\usym{27B0}</code>
?	<code>\usym{2753}</code>	❻	<code>\usym{2760}</code>	)	<code>\usym{276D}</code>	⌚⌚	<code>\usym{27BF}</code>
?	<code>\usym{2754}</code>	❼	<code>\usym{2761}</code>	(	<code>\usym{276E}</code>		

All `utfsym` symbols are implemented with TikZ graphics, not with a font. In addition to `\usym`, the `utfsym` package defines `\usymH`, which renders a symbol at a given height, and `\usymW`, which renders a symbol at a given width. See the `utfsym` documentation for more information.

# Chapter 6

## Ancient languages

This chapter presents letters and ideograms from various ancient scripts. Some of these symbols may also be useful in other typesetting contexts because of their pictorial nature.

TABLE 456: phaistos Symbols from the Phaistos Disk

	\PHarrow		\PHeagle		\PHplumedHead
	\PHbee		\PHflute		\PHram
	\PHbeehive		\PHgaunlet		\PHrosette
	\PHboomerang		\PHgrater		\PHsaw
	\PHbow		\PHhelmet		\PHshield
	\PHbullLeg		\PHhide		\PHship
	\PHcaptive		\PHhorn		\PHsling
	\PHcarpentryPlane		\PHlid		\PHsmallAxe
	\PHcat		\PHlily		\PHtrainer
	\PHchild		\PHmanacles		\PHtattooedHead
	\PHclub		\PHmattock		\PHtiara
	\PHcolumn		\PHoxBack		\PHtunny
	\PHcomb		\PHpapyrus		\PHvine
	\PHdolium		\PHpedestrian		\PHwavyBand
	\PHdove		\PHplaneTree		\PHwoman

TABLE 457: protosem Proto-Semitic Characters

ࠠ	\Aaleph	ࠢ	\AAhe	ࠣ	\Akaph	ࠤ	\AAayin	ࠥ	\AAresh
ࠡ	\AAaleph	ࠦ	\Avav	ࠤ	\AAkaph	ࠦ	\Ape	ࠧ	\Ashin
ࠢ	\Abeth	=	\Azayin	ࠦ	\Alamed	ࠦ	\AApe	+	\Atav
ࠣ	\AAbeth	ࠩ	\Aheth	ࠦ	\AAAlamed	ࠦ	\Asade	ࠦ	\Ahelmet
ࠤ	\Agimel	ࠪ	\AAheth	ࠩ	\Amem	ࠦ	\AAAsade	ࠦ	\AAhelmet
ࠥ	\Adaleth	ࠩ	\Ateth	ࠦ	\Anun	ࠩ	\Aqoph		
ࠦ	\AAdaleth	ࠩ	\Ayod	ࠦ	\Asamekh	ࠩ	\AAqoph		
ࠨ	\Ahe	ࠩ	\AAyod	ࠦ	\Aayin	ࠩ	\Aresh		

The `protosem` package defines abbreviated control sequences for each of the above. In addition, single-letter shortcuts can be used within the argument to the `\textproto` command (e.g., “`\textproto{Pakyn}`” produces “ࠠࠢࠤࠦࠩ”). See the `protosem` documentation for more information.

TABLE 458: *hierogl{f}* Hieroglyphics

	\HA		\HI		\Hn		\HT
	\Ha		\Hi		\HO		\Ht
	\HB		\Hibl		\Ho		\Htongue
	\Hb		\Hibp		\Hp		\HU
	\Hc		\Hibs		\HP		\Hu
	\HC		\Hibw		\Hplural		\HV
	\HD		\HJ		\Hplus		\Hv
	\Hd		\Hj		\HQ		\Hvbar
	\Hdual		\Hk		\Hq		\Hw
	\He		\HK		\Hquery		\HW
	\HE		\HL		\HR		\HX
	\Hf		\HL		\Hr		\Hx
	\HF		\Hm		\Hs		\HY
	\HG		\HM		\HS		\Hy
	\Hg		\Hman		\Hscribe		\Hz
	\Hh		\Hms		\Hslash		\HZ
	\HH		\HN		\Hsv		
	\Hone		\Hhundred		\HXthousand		\Hmillion
	\Hten		\Hthousand		\HCthousand		

The *hierogl{f}* package defines alternate control sequences and single-letter shortcuts for each of the above which can be used within the argument to the \textpmhg command (e.g., “\textpmhg{Pakin}” produces “   ”). See the *hierogl{f}* documentation for more information.

TABLE 459: *linearA* Linear A Script

	\LinearAI		\LinearAXCIX		\LinearACXCVII		\LinearACCXCV
	\LinearAII		\LinearAC		\LinearACXCVIII		\LinearACCXCVI
	\LinearAIII		\LinearACI		\LinearACXCIX		\LinearACCXCVII
	\LinearAIV		\LinearACII		\LinearACC		\LinearACCXCVIII
	\LinearAV		\LinearACIII		\LinearACCI		\LinearACCXCIX

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⊕ \LinearAVI	⊗ \LinearACIV	⊛ \LinearACII	⊛ \LinearACCC
+ \LinearAVII	⊜ \LinearACV	⊛ \LinearACIII	⊛ \LinearACCCI
⊛ \LinearAVIII	⊗ \LinearACVI	⊛ \LinearACCIV	⊛ \LinearACCCII
⊛ \LinearAIX	↑ \LinearACVII	⊛ \LinearACCV	⊛ \LinearACCCIII
⊛ \LinearAX	⊗ \LinearACVIII	⊛ \LinearACCVI	⊛ \LinearACCCIV
⊕ \LinearAXI	⊗ \LinearACIX	⊛ \LinearACCVII	⊛ \LinearACCCV
⊛ \LinearAXII	⊛ \LinearACX	⊛ \LinearACCVIII	⊛ \LinearACCCVI
⊛ \LinearAXIII	⊛ \LinearACXI	⊛ \LinearACCIX	⊛ \LinearACCCVII
⊛ \LinearAXIV	⊛ \LinearACXII	⊛ \LinearACCX	⊛ \LinearACCCVIII
⊛ \LinearAXV	⊛ \LinearACXIII	⊛ \LinearACCXI	⊛ \LinearACCCIX
⊛ \LinearAXVI	⊛ \LinearACXIV	⊛ \LinearACCXII	⊛ \LinearACCCX
⊛ \LinearAXVII	⊛ \LinearACXV	⊛ \LinearACCXIII	⊛ \LinearACCCXI
⊛ \LinearAXVIII	⊛ \LinearACXVI	⊛ \LinearACCXIV	⊛ \LinearACCCXII
⊛ \LinearAXIX	⊛ \LinearACXVII	⊛ \LinearACCXV	⊛ \LinearACCCXIII
↑ \LinearAXX	⊛ \LinearACXVIII	⊛ \LinearACCXVI	⊛ \LinearACCCXIV
⊛ \LinearAXXI	⊛ \LinearACXIX	⊛ \LinearACCXVII	⊛ \LinearACCCXV
⊛ \LinearAXXII	⊛ \LinearACXX	⊛ \LinearACCXVIII	⊛ \LinearACCCXVI
⊛ \LinearAXXIII	⊛ \LinearACXXI	⊛ \LinearACCXIX	⊛ \LinearACCCXVII
⊛ \LinearAXXIV	⊛ \LinearACXXII	⊛ \LinearACCXX	⊛ \LinearACCCXVIII
⊛ \LinearAXXV	⊛ \LinearACXXIII	⊛ \LinearACCXXI	⊛ \LinearACCCXIX
↑ \LinearAXXVI	⊛ \LinearACXXIV	⊛ \LinearACCXXII	⊛ \LinearACCCXX
⊛ \LinearAXXVII	⊛ \LinearACXXV	⊛ \LinearACCXXIII	⊛ \LinearACCCXXI
⊛ \LinearAXXVIII	⊛ \LinearACXXVI	⊛ \LinearACCXXIV	⊛ \LinearACCCXXII
⊛ \LinearAXXIX	⊛ \LinearACXXVII	⊛ \LinearACCXXV	⊛ \LinearACCCXXIII
⊛ \LinearAXX	⊛ \LinearACXXVIII	⊛ \LinearACCXXVI	⊛ \LinearACCCXXIV
⊛ \LinearAXXI	⊛ \LinearACXXIX	⊛ \LinearACCXXVII	⊛ \LinearACCCXXV
⊛ \LinearAXXII	⊛ \LinearACXXX	⊛ \LinearACCXXVIII	⊛ \LinearACCCXXVI
⊛ \LinearAXXIII	⊛ \LinearACXXXI	⊛ \LinearACCXXIX	⊛ \LinearACCCXXVII
⊛ \LinearAXXIV	⊛ \LinearACXXXII	⊛ \LinearACXXX	⊛ \LinearACCCXXVIII
⊛ \LinearAXXV	⊛ \LinearACXXXIII	⊛ \LinearACCXXXI	⊛ \LinearACCCXXIX
⊛ \LinearAXXVI	⊛ \LinearACXXXIV	⊛ \LinearACCXXXII	⊛ \LinearACCCXXX
⊛ \LinearAXXVII	⊛ \LinearACXXXV	⊛ \LinearACCXXXIII	⊛ \LinearACCCXXXI
⊛ \LinearAXXVIII	⊛ \LinearACXXXVI	⊛ \LinearACCXXXIV	⊛ \LinearACCCXXXII
⊛ \LinearAXXIX	⊛ \LinearACXXXVII	⊛ \LinearACCXXXV	⊛ \LinearACCCXXXIII
⊛ \LinearAXL	⊛ \LinearACXXXVIII	⊛ \LinearACCXXXVI	⊛ \LinearACCCXXXIV
⊛ \LinearAXLI	⊛ \LinearACXXXIX	⊛ \LinearACCXXXVII	⊛ \LinearACCCXXXV
⊛ \LinearAXLII	⊛ \LinearACXL	⊛ \LinearACCXXXVIII	⊛ \LinearACCCXXXVI
⊛ \LinearAXLIII	⊛ \LinearACXLII	⊛ \LinearACCXXXIX	⊛ \LinearACCCXXXVII
⊛ \LinearAXLIV	⊛ \LinearACXLII	⊛ \LinearACXL	⊛ \LinearACCCXXXVIII
⊛ \LinearAXLV	⊛ \LinearACXLIII	⊛ \LinearACXLII	⊛ \LinearACCCXXXIX
⊛ \LinearAXLVI	⊛ \LinearACXLIV	⊛ \LinearACXLII	⊛ \LinearACCCXL
⊛ \LinearAXLVII	⊛ \LinearACXLV	⊛ \LinearACXLIII	⊛ \LinearACCCXLII
⊛ \LinearAXLVIII	⊛ \LinearACXLVI	⊛ \LinearACXLIV	⊛ \LinearACCCXLII
⊛ \LinearAXLIX	⊛ \LinearACXLVII	⊛ \LinearACXLV	⊛ \LinearACCCXLIII
⊛ \LinearAL	⊛ \LinearACXLVIII	⊛ \LinearACXLVI	⊛ \LinearACCCXLIV

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❖ \LinearALI	❖ \LinearACLIX	❖ \LinearACCXLVII	❖ \LinearACCCXLV
❖ \LinearALII	❖ \LinearACL	❖ \LinearACCXLVIII	❖ \LinearACCCXLVI
❖ \LinearALIII	❖ \LinearACLI	❖ \LinearACCXLIX	❖ \LinearACCCXLVII
❖ \LinearALIV	❖ \LinearACLII	❖ \LinearACCL	❖ \LinearACCCXLVIII
❖ \LinearALV	❖ \LinearACLIII	❖ \LinearACCLI	❖ \LinearACCCXLIX
❖ \LinearALVI	❖ \LinearACLIV	❖ \LinearACCLII	❖ \LinearACCL
❖ \LinearALVII	❖ \LinearACLV	❖ \LinearACCLIII	❖ \LinearACCL
❖ \LinearALVIII	❖ \LinearACLVI	❖ \LinearACCLIV	❖ \LinearACCLII
❖ \LinearALIX	❖ \LinearACLVII	❖ \LinearACCLV	❖ \LinearACCLIII
❖ \LinearALX	❖ \LinearACLVIII	❖ \LinearACCLVI	❖ \LinearACCLIV
❖ \LinearALXI	❖ \LinearACLIX	❖ \LinearACCLVII	❖ \LinearACCLV
❖ \LinearALXII	❖ \LinearACLX	❖ \LinearACCLVIII	❖ \LinearACCLVI
❖ \LinearALXIII	❖ \LinearACLXI	❖ \LinearACCLIX	❖ \LinearACCLVII
❖ \LinearALXIV	❖ \LinearACLXII	❖ \LinearACCLX	❖ \LinearACCLVIII
❖ \LinearALXV	❖ \LinearACLXIII	❖ \LinearACCLXI	❖ \LinearACCLIX
❖ \LinearALXVI	❖ \LinearACLXIV	❖ \LinearACCLXII	❖ \LinearACCLX
❖ \LinearALXVII	❖ \LinearACLXV	❖ \LinearACCLXIII	❖ \LinearACCLXI
❖ \LinearALXVIII	❖ \LinearACLXVI	❖ \LinearACCLXIV	❖ \LinearACCLXII
❖ \LinearALXIX	❖ \LinearACLXVII	❖ \LinearACCLXV	❖ \LinearACCLXIII
❖ \LinearALXX	❖ \LinearACLXVIII	❖ \LinearACCLXVI	❖ \LinearACCLXIV
❖ \LinearALXXI	❖ \LinearACLXIX	❖ \LinearACCLXVII	❖ \LinearACCLXV
❖ \LinearALXXII	❖ \LinearACLXX	❖ \LinearACCLXVIII	❖ \LinearACCLXVI
❖ \LinearALXXIII	❖ \LinearACLXXI	❖ \LinearACCLXIX	❖ \LinearACCLXVII
❖ \LinearALXXIV	❖ \LinearACLXXII	❖ \LinearACCLXX	❖ \LinearACCLXVIII
❖ \LinearALXXV	❖ \LinearACLXXIII	❖ \LinearACCLXXI	❖ \LinearACCLXIX
❖ \LinearALXXVI	❖ \LinearACLXXIV	❖ \LinearACCLXXII	❖ \LinearACCLXX
❖ \LinearALXXVII	❖ \LinearACLXXV	❖ \LinearACCLXXIII	❖ \LinearACCLXXI
❖ \LinearALXXVIII	❖ \LinearACLXXVI	❖ \LinearACCLXXIV	❖ \LinearACCLXXII
❖ \LinearALXXIX	❖ \LinearACLXXVII	❖ \LinearACCLXXV	❖ \LinearACCLXXIII
❖ \LinearALXXX	❖ \LinearACLXXVIII	❖ \LinearACCLXXVI	❖ \LinearACCLXXIV
❖ \LinearALXXXI	❖ \LinearACLXXIX	❖ \LinearACCLXXVII	❖ \LinearACCLXXV
❖ \LinearALXXXII	❖ \LinearACLXXX	❖ \LinearACCLXXVIII	❖ \LinearACCLXXVI
❖ \LinearALXXXIII	❖ \LinearACLXXXI	❖ \LinearACCLXXIX	❖ \LinearACCLXXVII
❖ \LinearALXXXIV	❖ \LinearACLXXXII	❖ \LinearACCLXXX	❖ \LinearACCLXXVIII
❖ \LinearALXXXV	❖ \LinearACLXXXIII	❖ \LinearACCLXXXI	❖ \LinearACCLXXIX
❖ \LinearALXXXVI	❖ \LinearACLXXXIV	❖ \LinearACCLXXXII	❖ \LinearACCLXXX
❖ \LinearALXXXVII	❖ \LinearACLXXXV	❖ \LinearACCLXXXIII	❖ \LinearACCLXXXI
❖ \LinearALXXXVIII	❖ \LinearACLXXXVI	❖ \LinearACCLXXXIV	❖ \LinearACCLXXXII
❖ \LinearALXXXIX	❖ \LinearACLXXXVII	❖ \LinearACCLXXXV	❖ \LinearACCLXXXIII
❖ \LinearALXXXX	❖ \LinearACLXXXVIII	❖ \LinearACCLXXXVI	❖ \LinearACCLXXXIV
❖ \LinearAXCI	❖ \LinearACXXXIX	❖ \LinearACCLXXXVII	❖ \LinearACCLXXXV
❖ \LinearAXCII	❖ \LinearACXXXX	❖ \LinearACCLXXXVIII	❖ \LinearACCLXXXVI
❖ \LinearAXCIII	❖ \LinearACXCI	❖ \LinearACCLXXXIX	❖ \LinearACCLXXXVII
❖ \LinearAXCIV	❖ \LinearACXII	❖ \LinearACCLXXXX	❖ \LinearACCLXXXVIII
❖ \LinearAXCV	❖ \LinearACXIII	❖ \LinearACCXCI	❖ \LinearACCLXXXIX
❖ \LinearAXCVI	❖ \LinearACXCIV	❖ \LinearACXCII	❖ \LinearACCLXXXIX

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፩	\LinearAXCVII	፪	\LinearACXCV	፫	\LinearACCXCIII
፪	\LinearAXCVIII	፬	\LinearACXCVI	፭	\LinearACCXCIV

TABLE 460: `linearb` Linear B Basic and Optional Letters

፩	\Ba	፪	\Bja	፫	\Bmu	፬	\Bpte	፭	\Broii	፮	\Bto
፪	\Baii	፫	\Bje	፯	\Bna	፬	\Bpu	፯	\Bru	፻	\Btu
፯	\Baiii	፯	\Bjo	፯	\Bne	፯	\Bpuii	፯	\Bsa	፻	\Btwo
፯	\Bau	፯	\Bju	፯	\Bni	፯	\Bqa	፯	\Bse	፻	\Bu
፯	\Bda	፯	\Bka	፯	\Bno	፯	\Bqe	፯	\Bsi	፻	\Bwa
፯	\Bde	፯	\Bke	፯	\Bnu	፯	\Bqi	፯	\Bso	፻	\Bwe
፯	\Bdi	፯	\Bki	፯	\Bnwa	፯	\Bqo	፯	\Bsu	፻	\Bwi
፯	\Bdo	፯	\Bko	፯	\Bo	፯	\Bra	፯	\Bswa	፻	\Bwo
፯	\Bdu	፯	\Bku	፯	\Bpa	፯	\Braii	፯	\Bswi	፯	\Bza
፯	\Bdwe	፯	\Bma	፯	\Bpaiii	፯	\Braiii	፯	\Bta	፻	\Bze
፯	\Bdwo	፯	\Bme	፯	\Bpe	፯	\Bre	፯	\Btaii	፻	\Bzo
፯	\Be	፯	\Bmi	፯	\Bpi	፯	\Bri	፯	\Bte		
፯	\Bi	፯	\Bmo	፯	\Bpo	+	\Bro	፯	\Bti		

These symbols must appear either within the argument to `\textlinb` or following the `\linbfamily` font-selection command within a scope. Single-character shortcuts are also supported: Both “`\textlinb{\Bpa\Bki\Bna}`” and “`\textlinb{pcn}`” produce “`+፯፯፯`”, for example. See the `linearb` documentation for more information.

TABLE 461: `linearb` Linear B Numerals

፩	\BNi	፩	\BNvii	፩	\BNxl	○	\BNc	፩	፩	\BNdcc
፪	\BNii	፩	\BNviii	፩	\BNl	○	\BNcc	፩	፩	\BNdccc
፯	\BNiii	፩	\BNix	፩	\BNlx	○	\BNccc	፩	፩	\BNcm
፯	\BNiv		\BNx	፩	\BNlxx	○	\BNcd	○		\BNm
፯	\BNv	=	\BNxx	፩	\BNlxxx	○	\BNd			
፯	\BNvi	≡	\BNxxx	፩	\BNxc	○	\BNdc			

These symbols must appear either within the argument to `\textlinb` or following the `\linbfamily` font-selection command within a scope.

TABLE 462: *linearb* Linear B Weights and Measures

ℳ	\BPtalent	՚	\BPvolb	՚	\BPvolcf	՚	\BPwtb	՚	\BPwtd
՝	\BPvola	՚	\BPvolcd	՚	\BPwta	՚	\BPwtc	՚	

These symbols must appear either within the argument to `\textlinb` or following the `\linbfamily` font-selection command within a scope.

TABLE 463: *linearb* Linear B Ideograms

🏺	\BParamphora	艚	\BPchassis	ԑ	\BPman	平民	\BPwheat
➔	\BParrow	⠀	\BPcloth	ԑ	\BPnanny	⠀	\BPwheel
՚	\BPbarley	⠀	\BPcow	՚	\BPolive	⠀	\BPwine
՚	\BPbilly	⠀	\BPcup	՚	\BPOx	⠀	\BPwineiih
՚	\BPboar	⠀	\BPewe	՚	\BPpig	⠀	\BPwineiiih
⠀	\BPbronze	⠀	\BPfoal	՚	\BPram	⠀	\BPwineivh
՚	\BPbull	՚	\BPgoat	՚	\BPsheep	՚	\BPwoman
⠀	\BPCauldroni	⠀	\BPgoblet	՚	\BPsow	⠀	\BPwool
⠀	\BPCauldronii	⠀	\BPgold	⠀	\BPspear	⠀	
⠀	\BPchariot	⠀	\BPhorse	⠀	\BPsword	⠀	

These symbols must appear either within the argument to `\textlinb` or following the `\linbfamily` font-selection command within a scope.

TABLE 464: *linearb* Unidentified Linear B Symbols

兮	\BUi	兮	\BUiv	兮	\BUvii	兮	\BUx	兮	\Btwe
兮	\BUii	兮	\BUv	兮	\BUviii	兮	\BUxi	兮	
兮	\BUiii	兮	\BUvi	兮	\BUix	兮	\BUxii	兮	

These symbols must appear either within the argument to `\textlinb` or following the `\linbfamily` font-selection command within a scope.

TABLE 465: cypriot Cypriot Letters

☀	\Ca	☀	\Cku	☒	\Cmu	ጀ	\Cpo	ጀ	\Cso	ጀ	\Cwi
☀	\Ce	☽	\Cla	Ӯ	\Cna	ጀ	\Cpu	Ӯ	\Csu	↑	\Cwo
Ӯ	\Cga	Ӯ	\Cle	՚	\Cne	Ӯ	\Cra	՚	\Cta	)	\Cxa
Ӯ	\Ci	≤	\Cli	՚	\Cni	՚	\Cre	՚	\Cte	(	\Cxe
߱	\Cja	+	\Clo	՚	\Cno	՚	\Cri	↑	\Cti	߱	\Cya
߱	\Cjo	߱	\Clu	߱	\Cnu	߱	\Cro	߱	\Cto	߱	\Cyo
߱	\Cka	߱	\Cma	߱	\Co	߱	\Cru	߱	\Ctu	߱	\Cza
߱	\Cke	߱	\Cme	՚	\Cpa	߱	\Csa	߱	\Cu	߱	\Czo
߱	\Cki	߱	\Cmi	՚	\Cpe	߱	\Cse	߱	\Cwa	߱	
߱	\Cko	߱	\Cmo	߱	\Cpi	߱	\Csi	I	\Cwe		

These symbols must appear either within the argument to `\textcypr` or following the `\cyprfamily` font-selection command within a scope. Single-character shortcuts are also supported: Both “`\textcypr{\Cpa\Cki\Cna}`” and “`\textcypr{pcn}`” produce “՚߱߶߷”, for example. See the `cypriot` documentation for more information.

TABLE 466: sarabian South Arabian Letters

◦	\SAa	ܵ	\SAz	ܴ	\SAM	ܸ	\SAsd	ܹ	\SAdb
ܰ	\SAb	ܲ	\SAhd	ܲ	\SAN	ܲ	\SAq	ܲ	\SATb
ܲ	\SAg	ܲ	\SATd	ܲ	\SAs	ܲ	\SAr	ܲ	\SAGa
ܲ	\SAd	ܲ	\SAY	ܲ	\SAf	ܲ	\SAsv	ܲ	\SAzd
ܲ	\SAh	ܲ	\SAk	ܲ	\SAlq	ܲ	\SAT	ܲ	\SAsa
ܲ	\SAw	ܲ	\SAI	ܲ	\SAo	ܲ	\SAhu	ܲ	\SAdd

These symbols must appear either within the argument to `\textsarab` or following the `\sarabfamily` font-selection command within a scope. Single-character shortcuts are also supported: Both “`\textsarab{\SAb\SAk\SAn}`” and “`\textsarab{bkn}`” produce “ܲܲܲ”, for example. See the `sarabian` documentation for more information.

TABLE 467: teubner Archaic Greek Letters and Greek Numerals

Ϙ	\Coppa <sup>†</sup>	F	\Digamma*	ϙ	\sampi*	ϙ	\varstigma
ϙ	\coppa <sup>†</sup>	ϙ	\koppa*	Ϙ	\Stigma		
ϙ	\digamma*,‡	ϙ	\Sampi	ϙ	\stigma*		

\* Technically, these symbols do not require *teubner*; it is sufficient to load the *babel* package with the *greek* option (upon which *teubner* depends)—but use *\qoppa* for *\koppa* and *\ddigamma* for *\digamma*.

† For compatibility with other naming conventions *teubner* defines *\Koppa* as a synonym for *\Coppa* and *\varcoppa* as a synonym for *\coppa*.

‡ If both *teubner* and *amssymb* are loaded, *teubner*'s *\digamma* replaces *amssymb*'s *\digamma*, regardless of package-loading order.

TABLE 468: boisik Archaic Greek Letters and Greek Numerals

F	\Digamma	ϙ	\qoppa	ϙ	\stigma	ϙ	\varsampi
F	\digamma	Ϙ	\Qoppa	Ϙ	\Stigma		
ϙ	\heta	ϙ	\Sampi	ϙ	\vardigamma		
F	\Heta	ϙ	\sampi	ϙ	\Varsampi		

TABLE 469: epiolmec Epi-Olmec Script

	\EOafter		\EOMiddle		\EOStarWarrior
	\EOandThen		\EOmonster		\EOstep
	\EOAppear		\EOMountain		\EOSu
	\EOBeardMask		\EOmuu		\EOsu
	\EOBedeck		\EOna		\EOSun
	\EOBlood		\EOne		\EOSuu
	\EObrace		\EOni		\EOSuu
	\EObuilding		\EOnow		\EOta
	\EOBundle		\EOnu		\EOte
	\EOChop		\EOnuu		\EOthrone

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	\EOChronI		\EOofficerI		\E0ti
	\EOCloth		\EOofficerII		\E0time
	\E0DealWith		\EOofficerIII		\E0Time
	\EODeer		\EOofficerIV		\E0Title
	\EOeat		\EOpa		\E0TitleII
	\EOflint		\EOpak		\E0TitleIV
{ 	\EOflower		\EOPatron		\E0to
	\EOFold		\EOPatronII		\E0tu
	\EOGod		\EOpe		\E0tuki
	\EOGoUp		\EOopenis		\E0tukpa
	\EOgovernor		\EOpi		\E0turtle
	\EOguise		\EOPierce		\E0tuuu
	\EOHallow		\EOPlant		\E0tzza
	\EOja		\EOPlay		\E0tzze
	\EOjaguar		\EOpo		\E0tzetze
	\EOje		\EOpriest		\E0otzi
	\EOji		\EOPrince		\E0otzu
	\EOJI		\EOPu		\E0tzuu
	\EOjo		\EOPuu		\E0undef
	\EOju		\EOPuuk		\E0varBeardMask
	\EOkak		\EORain		\E0varja
	\EOke		\EOSa		\E0varji
	\EOki		\EOsa		\E0varki
	\EOkij		\EOSacrifice		\E0varkuu
	\EOKing		\EOSaw		\E0varni
	\EOknottedCloth		\EOScorpius		\E0varpa

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	\EOknottedClothStraps		\EOset		\EOvarSi
	\EOko		\EOSi		\EOvarsi
	\EOku		\EOSi		\EOvartza
	\EOkuu		\EOsing	○ ○	\EOvarwuu
	\EOLetBlood		\EOSini		\EOvarYear
	\EOLoinCloth		\EOSkin		\EOwa
	\EOLongLipII		\EOSky		\EOwe
	\EOLord		\EOSkyAnimal		\EOwi
	\EOLose		\EOSkyPillar		\EOwo
	\EOma		\EOSnake		\EOwuu
	\EOmacaw		\EOSo		\EOya
	\EOmacawI		\EOSpan		\EOyaj
	\EOme		\EOSprinkle		\EOye
	\EOMexNew		\EOstar		\EOYear
	\EOmi		\EOstarWarrior		\EOyuu

TABLE 470: epiolmec Epi-Olmec Numerals

	\EOzero		\EOvi		\EOxii		\EOxviii
○	\EOi	○○	\EOvii	○○○	\EOxiii	○○○○	\EOxix
○ ○	\EOii	○○○	\EOviii	○○○○	\EOxiv	○○○○○	\EOxx
○ ○ ○	\EOiii	○○○○	\EOix	○○○○○	\EOxv		
○○○○	\EOiv	○○○○○	\EOx	○○○○○○	\EOxvi		
—	\EOv	—○	\EOxi	—○○	\EOxvii		

TABLE 471: `allrunes` Runes

þ	\a	Þ	E	ɸ	\ING	ᛘ	m	ȝ	R	ȝ	\sthree
*	\A	Ƒ	F	ꝑ	\ing	ᬁ	n	ꝑ	\RR	ᬁ	T
ƒ	a	Ƒ	f	ꝑ	\Ing	᜵	\NG	ᜲ	\s	ᜲ	t
ᜲ	A	X	g	ꝑ	\j	᜶	\ng	ᜳ	s	ᜲ	\textsection
ᜱ	b	H	h	ꝑ	j	᜷	o	ᜳ	S	᜷	\th
ᜱ	B	N	H	ᜲ	J	᜸	p	ᜳ	\seight	᜸	U
ᜱ	\d	H	h	ꝑ	\k	᜹	p	ᜳ	\sfive	᜹	u
ᜱ	D	ȝ	\i	ꝑ	\K	᜺	P	ᜳ	\sfour	᜺	w
ᜱ	d	I	i	ᜲ	k	᜻	\R	ᜳ	\sseven		
ᜱ	e	ȝ	I	ᜲ	l	᜼	r	ᜳ	\ssix		

The symbols in this table should appear within the argument to `\textarc` (for common Germanic runes), `\textara` (for Anglo-Frisian runes), `\textarn` (for normal runes), `\textart` (for short-twig runes), `\textarl` (for staveless runes), `\textarm` (for medieval runes), or within a scope that sets, respectively, `\arcfamily`, `\arafamily`, `\arnfamily`, `\artfamily`, `\arlfamily`, or `\armfamily`. Each family presents slightly different glyphs and/or slightly different subsets of the available runes. (The table presents the common Germanic runes.) See the `allrunes` documentation for more information.

TABLE 472: `allrunes` Rune Separators

:	\bar	:	\doubleeye	+	\plus	:	\tripledot
*	\cross	‡	\doubleplus	⋮	\quaddot	⋮	\tripleeye
.	\dot	‡	\doublestar	◦	\quadeye	‡	\tripleplus
:	\doublebar	·	\eye	*	\star		
*	\doublecross	⋮	\pentdot	⋮	\triplebar		
:	\doubledot	+	\penteye	⋮	\triplecross		

See the usage comment under Table 471 on page 211.

# Chapter 7

## Musical symbols

The following symbols are used to typeset musical notation. The *lilylypbs* package provides a large subset of the symbols in this chapter. Note, however, that *lilylypbs* depends upon the *fontspec* package, OpenType (.otf) fonts, and some PDF graphics and therefore works only with Lua<sup>L</sup>AT<sub>E</sub>X or X<sub>E</sub>H<sup>L</sup>AT<sub>E</sub>X.

A simple way to typeset time signatures, due to Daniel Hirst, is to attach a superscript and a subscript to an empty math object. For example,  $\$\\{\\}^3_4\$$  renders as “ $\frac{3}{4}$ ”. Because superscripts and subscripts are left-justified, some extra padding may need to be added if the beats per measure and beat unit contain different numbers of digits. A 5mu space (“ $\\;$ ”) vertically centers the “8” relative to the “12” in  $\$\\{\\}^{12}_8\$$  (“ $\frac{12}{8}$ ”). For boldface time signatures (e.g., “ $\frac{4}{4}$ ”), consider the boldface-math options presented in Section 12.5. See also Table 486.

TABLE 473: L<sup>A</sup>T<sub>E</sub>X 2 <sub>$\varepsilon$</sub>  Musical Symbols

♭ \flat ♯ \natural ♯ \sharp

TABLE 474: *textcomp* Musical Symbols

♪ \textmusicalnote

TABLE 475: *wasy sym* Musical Symbols

♪ \eighthnote ♫ \halfnote ♪ \twonotes . \fullnote ♪ \quaternote

TABLE 476: *MnSymbol* Musical Symbols

♭ \flat ♯ \natural ♯ \sharp

TABLE 477: `fdsymbol` Musical Symbols

```
\flat \natural \sharp
```

TABLE 478: `boisik` Musical Symbols

```
\flat \natural \sharp
```

TABLE 479: `stix` Musical Symbols

$\text{\eighthnote}$	$\text{\flat}$	$\text{\natural}$	$\text{\sharp}$
$\text{\flat}$	$\text{\quarternote}$	$\text{\twoNotes}$	

TABLE 480: `arev` Musical Symbols

$\text{\quarternote}$	$\text{\eighthnote}$	$\text{\sixteenthnote}$
-----------------------	----------------------	-------------------------

TABLE 481: `utfsym` Musical Symbols

$\text{\usym{2669}}$	$\text{\usym{266C}}$	$\text{\usym{266F}}$	$\text{\usym{1F3B5}}$
$\text{\usym{266A}}$	$\text{\usym{266D}}$	$\text{\usym{1F39C}}$	$\text{\usym{1F3B6}}$
$\text{\usym{266B}}$	$\text{\usym{266E}}$	$\text{\usym{1F39D}}$	$\text{\usym{1F3BC}}$

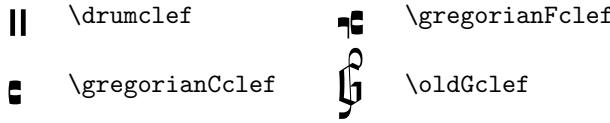
All `utsym` symbols are implemented with *TikZ* graphics, not with a font. In addition to `\usym`, the `utsym` package defines `\usymH`, which renders a symbol at a given height, and `\usymW`, which renders a symbol at a given width. See the `utsym` documentation for more information.

TABLE 482: MusiXTEX Musical Symbols

	\allabreve	>	\lsf		\shake
	\altoclef	v	\lsfz		\Shake
	\backturn		\maxima		\Shakel
	\bassclef	+	\meterplus		\Shakene
/	\caesura	~	\mordent		\Shakenw
	\coda	~~	\Mordent		\Shakesw
	\Coda		\PAUSE		\smallaltoclef
*	\Dep	-	\PAuse		\smallbassclef
[	\doublethumb	-	\pause		\smalltrebleclef
[	\downbow	\textcircled{d}	\Ped		\sPed
\gamma	\ds	\{\}	\qp		\trebleclef
\%	\duevolte	\:\:\:	\qqs	\sim	\trill
\circ	\fermatadown	\:\:\:	\qs	\circ	\turn
\cdot	\fermataup	\emptyset	\reverseallabreve	\vee	\upbow
\circ	\flageolett	\textcircled{C}	\reverseC	\triangleright	\usf
-	\hpause	*	\sDep	\wedge	\usfz
\circ	\hs		\Segno	\textcircled{D}	\wq
[	\longa		\segno	\textcircled{D}\textcircled{D}	\wqq

All of these symbols are intended to be used in the context of typesetting musical scores. See the MusiXTEX documentation for more information.

TABLE 483: MusiXTEX Alternative Clefs



In addition to MusiXTEX, `\drumclef` requires the `musixper` package; `\oldGclef` requires the `musixlit` package; and both `\gregorianCclef` and `\gregorianFclef` require the `musixgre` package. Together with MusiXTEX, these packages provide a complete system for typesetting percussion notation (`musixper`), liturgical music (`musixlit`), and Gregorian chants (`musixgre`, including the staves and all of the necessary neumes. See the MusiXTEX documentation for more information.

TABLE 484: `harmony` Musical Symbols

	<code>\AAcht</code>		<code>\DDohne</code>		<code>\Halb</code>		<code>\SechBR</code>		<code>\VM</code>
	<code>\Acht</code>		<code>\Dohne</code>		<code>\HaPa</code>		<code>\SechBR</code>		<code>\Zwdr</code>
	<code>\AchtBL</code>		<code>\Ds</code>		<code>\Pu</code>		<code>\SePa</code>		<code>\ZwPa</code>
	<code>\AchtBR</code>		<code>\DS</code>		<code>\Sech</code>		<code>\UB</code>		
	<code>\AcPa</code>		<code>\Ganz</code>		<code>\SechBL</code>		<code>\Vier</code>		
	<code>\DD</code>		<code>\GaPa</code>		<code>\SechBl</code>		<code>\ViPa</code>		

The MusiXTEX package must be installed to use `harmony`.

TABLE 485: musicography Musical Symbols

$\flat$	<code>\musDoubleFlat</code>	$\natural$	<code>\musNatural</code>	$\frac{1}{16}$	<code>\musSixtyFourth</code>
$\times$	<code>\musDoubleSharp</code>	$\frac{1}{8}$	<code>\musQuarter</code>	$\frac{1}{12}$	<code>\musSixtyFourthDotted</code>
$\downarrow$	<code>\musEighth</code>	$\frac{1}{16}$	<code>\musQuarterDotted</code>	$\frac{1}{24}$	<code>\musThirtySecond</code>
$\downarrow.$	<code>\musEighthDotted</code>	$\frac{1}{32}$	<code>\musSegno</code>	$\frac{1}{48}$	<code>\musThirtySecondDotted</code>
$\flat$	<code>\musFlat</code>	$\sharp$	<code>\musSharp</code>	$\circ$	<code>\musWhole</code>
$\downarrow$	<code>\musHalf</code>	$\frac{1}{32}$	<code>\musSixteenth</code>	$\circ.$	<code>\musWholeDotted</code>
$\downarrow.$	<code>\musHalfDotted</code>	$\frac{1}{64}$	<code>\musSixteenthDotted</code>		

musicography defines `\f1`, `\sh`, and `\na` as shorthands for `\musFlat`, `\musSharp`, and `\musNatural`, respectively. It also defines `\musCorchea` as an alias for `\musEighth`, `\musCorcheaDotted` as an alias for `\musEighthDotted`, `\musFusa` as an alias for `\musEighth`, `\musFusaDotted` as an alias for `\musEighthDotted`, `\musMinim` as an alias for `\musHalf`, `\musMinimDotted` as an alias for `\musHalfDotted`, `\musSemibreve` as an alias for `\musWhole`, `\musSemibreveDotted` as an alias for `\musWholeDotted`, `\musSemiminim` as an alias for `\musQuarter`, and `\musSemiminiminDotted` as an alias for `\musQuarterDotted`.

The MusiXTEX package must be installed to use `musicography`.

TABLE 486: musicography Time Signatures

<b>C</b>	<code>\meterC</code>	<b>C<sub>2</sub></b>	<code>\meterCThreeTwo</code>	<b>CZ</b>	<code>\meterCZ</code>
<b>C3</b>	<code>\meterCThree</code>	<b>C</b>	<code>\meterCutC</code>	<b>O</b>	<code>\meterO</code>

Other time signatures can be specified with `\musMeter`, as in

$$\text{\musMeter}\{2\}\{4\} \rightarrow \frac{2}{4}$$

The MusiXTEX package must be installed to use `musicography`.

TABLE 487: *harmony* Musical Accents

$\widehat{\widehat{A}}\widehat{a}$	<code>\Ferli{A}\Ferli{a}*</code>	$\widehat{A}\widehat{a}$	<code>\Ohne{A}\Ohne{a}*</code>
$\widehat{\widehat{A}}\widehat{a}$	<code>\Fermi{A}\Fermi{a}</code>	$\widetilde{A}\widetilde{a}$	<code>\Umd{A}\Umd{a}*</code>
$(\textcircled{A})\textcircled{a}$		<code>\Kr{A}\Kr{a}</code>	

\* These symbols take an optional argument which shifts the accent either horizontally or vertically (depending on the command) by the given distance.

In addition to the accents shown above, `\HH` is a special accent command that accepts five period-separated characters and typesets them such that “`\HH.X.a.b.c.d.`” produces “ $X^b_d$ ”. All arguments except the first can be omitted: “`\HH.X.....`” produces “ $X$ ”. `\Takt` takes two arguments and composes them into a musical time signature. For example, “`\Takt{12}{8}`” produces “ $^{12}_8$ ”. As two special cases, “`\Takt{c}{0}`” produces “ $C$ ” and “`\Takt{c}{1}`” produces “ $C$ ”.

The *MusiXTEX* package must be installed to use *harmony*.

TABLE 488: *lilyglyphs* Single Notes

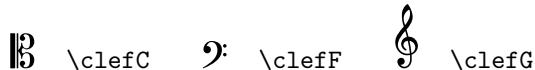
$\text{♪}$	<code>\eighthNote</code>	$\text{♩}$	<code>\quarterNoteDottedDown</code>
$\text{♪.}$	<code>\eighthNoteDotted</code>	$\text{♩.}$	<code>\quarterNoteDown</code>
$\text{♪..}$	<code>\eighthNoteDottedDouble</code>	$\text{♩..}$	<code>\sixteenthNote</code>
$\text{♪..}$	<code>\eighthNoteDottedDoubleDown</code>	$\text{♩..}$	<code>\sixteenthNoteDotted</code>
$\text{♪.}$	<code>\eighthNoteDottedDown</code>	$\text{♩..}$	<code>\sixteenthNoteDottedDouble</code>
$\text{♪}$	<code>\eighthNoteDown</code>	$\text{♩..}$	<code>\sixteenthNoteDottedDoubleDown</code>
$\text{♩}$	<code>\halfNote</code>	$\text{♩.}$	<code>\sixteenthNoteDottedDown</code>
$\text{♩.}$	<code>\halfNoteDotted</code>	$\text{♩..}$	<code>\sixteenthNoteDown</code>
$\text{♩..}$	<code>\halfNoteDottedDouble</code>	$\text{♩}$	<code>\thirtysecondNote</code>
$\text{♩..}$	<code>\halfNoteDottedDoubleDown</code>	$\text{♩.}$	<code>\thirtysecondNoteDotted</code>
$\text{♩.}$	<code>\halfNoteDottedDown</code>	$\text{♩..}$	<code>\thirtysecondNoteDottedDouble</code>
$\text{♩}$	<code>\halfNoteDown</code>	$\text{♩..}$	<code>\thirtysecondNoteDottedDoubleDown</code>
$\text{♪}$	<code>\quarterNote</code>	$\text{♩.}$	<code>\thirtysecondNoteDottedDown</code>
$\text{♪.}$	<code>\quarterNoteDotted</code>	$\text{♩..}$	<code>\thirtysecondNoteDown</code>
$\text{♪..}$	<code>\quarterNoteDottedDouble</code>	$\text{○}$	<code>\wholeNote</code>
$\text{♪..}$	<code>\quarterNoteDottedDoubleDown</code>	$\text{○.}$	<code>\wholeNoteDotted</code>

*lilyglyphs* defines synonyms for all of the preceding symbols:

♩	\crotchet	♩·	\minimDottedDown
♩.	\crotchetDotted	♩·	\minimDown
♩..	\crotchetDottedDouble	♪	\quaver
♩··	\crotchetDottedDoubleDown	♪.	\quaverDotted
♩·	\crotchetDottedDown	♪..	\quaverDottedDouble
♩	\crotchetDown	♪··	\quaverDottedDoubleDown
♪	\demisemiquaver	♪·	\quaverDottedDown
♪.	\demisemiquaverDotted	♪	\quaverDown
♪..	\demisemiquaverDottedDouble	♪.	\semibreve
♪··	\demisemiquaverDottedDoubleDown	♪..	\semibreveDotted
♪·	\demisemiquaverDottedDown	♪	\semiquaver
♪	\demisemiquaverDown	♪.	\semiquaverDotted
♩	\minim	♪..	\semiquaverDottedDouble
♩.	\minimDotted	♪··	\semiquaverDottedDoubleDown
♩..	\minimDottedDouble	♪·	\semiquaverDottedDown
♩··	\minimDottedDoubleDown	♪	\semiquaverDown

TABLE 489: *lilyglyphs* Beamed Notes

♫	\twoBeamedQuavers	♫♫	\threeBeamedQuaversII
♫♫	\threeBeamedQuavers	♫.♫	\threeBeamedQuaversIII
♫.♫	\threeBeamedQuaversI		

TABLE 490: *lilyglyphs* Clefs

Each of these symbols provides a smaller, “inline” form (`\clefCInline`, `\clefFInline`, and `\clefGInline`, respectively) intended for use within a paragraph. See the *lilyglyphs* documentation for more information.

TABLE 491: *lilyglyphs* Time Signatures

<b>C</b>	\lilyTimeC	<b>¶</b>	\lilyTimeCHalf
----------	------------	----------	----------------

*lilyglyphs* also provides a \lilyTimeSignature command that lets a user typeset single and compound time signatures by specifying a numerator and a denominator. See the *lilyglyphs* documentation for more information.

TABLE 492: *lilyglyphs* Accidentals

x	\doublesharp	#	\sharpArrowdown
b	\flat	#	\sharpArrowup
bb	\flatflat	#	\sharpSlashslashslashstem
b	\natural	#	\sharpSlashslashslashstemstem
#	\sharp	#	\sharpSlashslashstem
↑		#	\sharpArrowboth
↓		#	\sharpSlashslashstemstemstem

TABLE 493: *lilyglyphs* Rests

♪	\crotchetRest	♩	\quaverRestDotted
♪.	\crotchetRestDotted	♩.	\semiquaverRest
—	\halfNoteRest	♩.	\semiquaverRestDotted
—.	\halfNoteRestDotted	—	\wholeNoteRest
♩	\quaverRest	—.	\wholeNoteRestDotted

Multiply dotted rests can be produced with the \lilyPrintMoreDots command. See the *lilyglyphs* documentation for more information.

TABLE 494: *lilyglyphs* Dynamics Letters

<b>f</b>	\lilyDynamics{f}	<b>r</b>	\lilyDynamics{r}
<b>p</b>	\lilyDynamics{p}	<b>s</b>	\lilyDynamics{s}
<b>m</b>	\lilyDynamics{m}	<b>z</b>	\lilyDynamics{z}
<b>rf</b>		<b>rfz</b>	
		\lilyRFZ	

These letters and the digits 0–9 are the only alphanumerics defined by *lilyglyphs*'s underlying Emmentaler fonts.

TABLE 495: *lilyglyphs* Dynamics Symbols

<= \crescHairpin >= \decrescHairpin

TABLE 496: *lilyglyphs* Articulations

>	\lilyAccent	^	\marcato	,	\staccatissimo
<>	\lilyEspressivo	v	\marcatoDown	-	\tenuto
.	\lilyStaccato	±	\portato		
°	\lilyThumb	÷	\portatoDown		

TABLE 497: *lilyglyphs* Scripts

⌚ \fermata

TABLE 498: *lilyglyphs* Accordion Notation

☰	\accordionBayanBass	⊗	\accordionOldEE	☰	\accordionStdBass
⊖	\accordionDiscant	˥	\accordionPull		
⊖	\accordionFreeBass	〉	\accordionPush		

TABLE 499: *lilyglyphs* Named Time Signatures

⌚	\lilyGlyph{timesig.C22}	⌚	\lilyGlyph{timesig.mensural198}
⌚	\lilyGlyph{timesig.C44}	⌚	\lilyGlyph{timesig.neomensural122}
⌚	\lilyGlyph{timesig.mensural22}	⌚	\lilyGlyph{timesig.neomensural24}
⌚	\lilyGlyph{timesig.mensural24}	⌚	\lilyGlyph{timesig.neomensural32}
⌚	\lilyGlyph{timesig.mensural32}	⌚	\lilyGlyph{timesig.neomensural34}
⌚	\lilyGlyph{timesig.mensural34}	⌚	\lilyGlyph{timesig.neomensural44}
⌚	\lilyGlyph{timesig.mensural44}	⌚	\lilyGlyph{timesig.neomensural48}
⌚	\lilyGlyph{timesig.mensural48}	⌚	\lilyGlyph{timesig.neomensural64}
⌚	\lilyGlyph{timesig.mensural64}	⌚	\lilyGlyph{timesig.neomensural68}
⌚	\lilyGlyph{timesig.mensural68}	⌚	\lilyGlyph{timesig.neomensural68alt}
⌚	\lilyGlyph{timesig.mensural68alt}	⌚	\lilyGlyph{timesig.neomensural94}
⌚	\lilyGlyph{timesig.mensural94}	⌚	\lilyGlyph{timesig.neomensural98}

*lilyglyphs* defines shorter names for a few of these symbols. See Table 491.

TABLE 500: *lilyglypbs* Named Scripts

\lilyGlyph{scripts.arpeggio}  
\lilyGlyph{scripts.arpeggio.arrow.1}  
\lilyGlyph{scripts.arpeggio.arrow.M1}  
\lilyGlyph{scripts.augmentum}  
  
` \lilyGlyph{scripts.barline.kievan}  
` \lilyGlyph{scripts.caesura.curved}  
` \lilyGlyph{scripts.caesura.straight}  
` \lilyGlyph{scripts.circulus}  
` \lilyGlyph{scripts.coda}  
` \lilyGlyph{scripts.daccentus}  
` \lilyGlyph{scripts.dfermata}  
` \lilyGlyph{scripts.dlongfermata}  
` \lilyGlyph{scripts.dmarcato}  
` \lilyGlyph{scripts.downbow}  
` \lilyGlyph{scripts.downmordent}  
` \lilyGlyph{scripts.downprall}  
` \lilyGlyph{scripts.dpedalheel}  
` \lilyGlyph{scripts.dpedaltoe}  
` \lilyGlyph{scripts.dportato}  
` \lilyGlyph{scripts.dsemicirculus}  
` \lilyGlyph{scripts.dshortfermata}  
` \lilyGlyph{scripts.dsignumcongruentiae}  
` \lilyGlyph{scripts.dstaccatissimo}  
` \lilyGlyph{scripts.dverylongfermata}  
` \lilyGlyph{scripts.espr}  
` \lilyGlyph{scripts.flageolet}  
` \lilyGlyph{scripts.halfopen}  
` \lilyGlyph{scripts.halfopenvertical}  
` \lilyGlyph{scripts.ictus}  
` \lilyGlyph{scripts.lcomma}  
` \lilyGlyph{scripts.lineprall}  
` \lilyGlyph{scripts.lvarcomma}  
` \lilyGlyph{scripts.mordent}  
` \lilyGlyph{scripts.open}  
  
~~ \lilyGlyph{scripts.prall}  
~~ \lilyGlyph{scripts.pralldown}  
~~ \lilyGlyph{scripts.prallmordent}  
~~ \lilyGlyph{scripts.prallprall}  
~~ \lilyGlyph{scripts.prallup}  
, \lilyGlyph{scripts.rcomma}  
  
~~ \lilyGlyph{scripts.reverseturn}  
, \lilyGlyph{scripts.rvarcomma}  
% \lilyGlyph{scripts.segno}  
> \lilyGlyph{scripts.sforzato}  
◊ \lilyGlyph{scripts.snappizzicato}  
. \lilyGlyph{scripts.staccato}  
+ \lilyGlyph{scripts.stopped}  
- \lilyGlyph{scripts.tenuto}  
◊ \lilyGlyph{scripts.thumb}  
✓ \lilyGlyph{scripts.tickmark}  
• \lilyGlyph{scripts.trilelement}  
#r \lilyGlyph{scripts.trill}  
~ \lilyGlyph{scripts.trill\_element}  
∞ \lilyGlyph{scripts.turn}  
. \lilyGlyph{scripts.uaccentus}  
∞ \lilyGlyph{scripts.ufermata}\*  
.. \lilyGlyph{scripts.ulongfermata}  
^ \lilyGlyph{scripts.umarcato}  
V \lilyGlyph{scripts.upbow}  
u \lilyGlyph{scripts.upedalheel}  
v \lilyGlyph{scripts.upedaltoe}  
~~ \lilyGlyph{scripts.upmordent}  
: \lilyGlyph{scripts.uportato}  
~~ \lilyGlyph{scripts.uprall}  
. \lilyGlyph{scripts.usemicirculus}  
A \lilyGlyph{scripts.ushortfermata}  
S \lilyGlyph{scripts.usignumcongruentiae}  
. \lilyGlyph{scripts.ustaccatissimo}  
.. \lilyGlyph{scripts.uverylongfermata}  
# \lilyGlyph{scripts.varcoda}  
  
~~ \lilyGlyph{scripts.varsegno}

\* `\lilyGlypbs` defines `\fermata` as a shorter name for “ $\text{\textcircled{c}}$ ” than `\lilyGlyph{scripts.ufermata}`. See Table 497.

TABLE 501: *lilyglyphs* Named Rests

-	\lilyGlyph{rests.0}	-	\lilyGlyph{rests.4mensural}
.	\lilyGlyph{rests.0mensural}	:	\lilyGlyph{rests.4neomensural}
.	\lilyGlyph{rests.0neomensural}	:	\lilyGlyph{rests.5}
-	\lilyGlyph{rests.0o}* :	:	\lilyGlyph{rests.6}
-	\lilyGlyph{rests.1}	:	\lilyGlyph{rests.7}
.	\lilyGlyph{rests.1mensural}	■	\lilyGlyph{rests.M1}
.	\lilyGlyph{rests.1neomensural}	■	\lilyGlyph{rests.M1mensural}
-	\lilyGlyph{rests.1o}* :	■	\lilyGlyph{rests.M1neomensural}
:	\lilyGlyph{rests.2}* :	■	\lilyGlyph{rests.M1o}
:	\lilyGlyph{rests.2classical}	■	\lilyGlyph{rests.M2}
,	\lilyGlyph{rests.2mensural}	■	\lilyGlyph{rests.M2mensural}
,	\lilyGlyph{rests.2neomensural}	■	\lilyGlyph{rests.M2neomensural}
γ	\lilyGlyph{rests.3}* :	■■	\lilyGlyph{rests.M3}
,	\lilyGlyph{rests.3mensural}	■	\lilyGlyph{rests.M3mensural}
,	\lilyGlyph{rests.3neomensural}	■■	\lilyGlyph{rests.M3neomensural}
γ	\lilyGlyph{rests.4}* :		

\* *lilyglyphs* defines shorter names for these symbols. See Table 493.

TABLE 502: *lilyglyphs* Named Pedals

*	\lilyGlyph{pedal.*}	-	\lilyGlyph{pedal.M}
.	\lilyGlyph{pedal..}	ꝝ	\lilyGlyph{pedal.P}
ꝝ	\lilyGlyph{pedal.d}	ꝝꝝ	\lilyGlyph{pedal.Ped}
ꝝ	\lilyGlyph{pedal.e}		

TABLE 503: *lilyglyphs* Named Flags

/ \lilyGlyph{flags.d3}	) \lilyGlyph{flags.mensuralu03}
/ \lilyGlyph{flags.d4}	) \lilyGlyph{flags.mensuralu04}
/ \lilyGlyph{flags.d5}	) \lilyGlyph{flags.mensuralu05}
/ \lilyGlyph{flags.d6}	) \lilyGlyph{flags.mensuralu06}
/ \lilyGlyph{flags.d7}	) \lilyGlyph{flags.mensuralu13}
/ \lilyGlyph{flags.dgrace}	) \lilyGlyph{flags.mensuralu14}
{ \lilyGlyph{flags.mensurald03}	) \lilyGlyph{flags.mensuralu15}
{ \lilyGlyph{flags.mensurald04}	) \lilyGlyph{flags.mensuralu16}
{ \lilyGlyph{flags.mensurald05}	) \lilyGlyph{flags.mensuralu23}
{ \lilyGlyph{flags.mensurald06}	) \lilyGlyph{flags.mensuralu24}
{ \lilyGlyph{flags.mensurald13}	) \lilyGlyph{flags.mensuralu25}
{ \lilyGlyph{flags.mensurald14}	) \lilyGlyph{flags.mensuralu26}
{ \lilyGlyph{flags.mensurald15}	) \lilyGlyph{flags.u3}
{ \lilyGlyph{flags.mensurald16}	) \lilyGlyph{flags.u4}
{ \lilyGlyph{flags.mensurald23}	) \lilyGlyph{flags.u5}
{ \lilyGlyph{flags.mensurald24}	) \lilyGlyph{flags.u6}
{ \lilyGlyph{flags.mensurald25}	) \lilyGlyph{flags.u7}
{ \lilyGlyph{flags.mensurald26}	) \lilyGlyph{flags.ugrace}

TABLE 504: *lilyglyphs* Named Custodes

↖ \lilyGlyph{custodes.hufnagel.d0}	↖ \lilyGlyph{custodes.mensural.d0}
↖ \lilyGlyph{custodes.hufnagel.d1}	↖ \lilyGlyph{custodes.mensural.d1}
↖ \lilyGlyph{custodes.hufnagel.d2}	↖ \lilyGlyph{custodes.mensural.d2}
↙ \lilyGlyph{custodes.hufnagel.u0}	↙ \lilyGlyph{custodes.mensural.u0}
↙ \lilyGlyph{custodes.hufnagel.u1}	↙ \lilyGlyph{custodes.mensural.u1}
↙ \lilyGlyph{custodes.hufnagel.u2}	↙ \lilyGlyph{custodes.mensural.u2}
\lilyGlyph{custodes.medicaea.d0}	\lilyGlyph{custodes.vaticana.d0}
\lilyGlyph{custodes.medicaea.d1}	\lilyGlyph{custodes.vaticana.d1}
\lilyGlyph{custodes.medicaea.d2}	\lilyGlyph{custodes.vaticana.d2}
\lilyGlyph{custodes.medicaea.u0}	\lilyGlyph{custodes.vaticana.u0}
\lilyGlyph{custodes.medicaea.u1}	\lilyGlyph{custodes.vaticana.u1}
\lilyGlyph{custodes.medicaea.u2}	\lilyGlyph{custodes.vaticana.u2}

TABLE 505: *lilyglyp̄s* Named Clefs

¶	\lilyGlyph{clefs.blackmensural.c}	§	\lilyGlyph{clefs.mensural.g_change}
¶	\lilyGlyph{clefs.blackmensural.c_change}	¶	\lilyGlyph{clefs.neomensural.c}
¶	\lilyGlyph{clefs.C}* ¶	¶	\lilyGlyph{clefs.neomensural.c_change}
¶	\lilyGlyph{clefs.C_change}* ¶	¶	\lilyGlyph{clefs.percussion}
¶	\lilyGlyph{clefs.F}* ¶	¶	\lilyGlyph{clefs.percussion_change}
¶	\lilyGlyph{clefs.F_change}* ¶	¶	\lilyGlyph{clefs.petrucci.c1}
¶	\lilyGlyph{clefs.G}* ¶	¶	\lilyGlyph{clefs.petrucci.c1_change}
¶	\lilyGlyph{clefs.G_change}* ¶	¶	\lilyGlyph{clefs.petrucci.c2}
¶	\lilyGlyph{clefs.hufnagel.do}	¶	\lilyGlyph{clefs.petrucci.c2_change}
¶	\lilyGlyph{clefs.hufnagel.do.fa}	¶	\lilyGlyph{clefs.petrucci.c3}
¶	\lilyGlyph{clefs.hufnagel.do.fa_change}	¶	\lilyGlyph{clefs.petrucci.c3_change}
¶	\lilyGlyph{clefs.hufnagel.do_change}	¶	\lilyGlyph{clefs.petrucci.c4}
¶	\lilyGlyph{clefs.hufnagel.fa}	¶	\lilyGlyph{clefs.petrucci.c4_change}
¶	\lilyGlyph{clefs.hufnagel.fa_change}	¶	\lilyGlyph{clefs.petrucci.c5}
¶	\lilyGlyph{clefs.kievan.do}	¶	\lilyGlyph{clefs.petrucci.c5_change}
¶	\lilyGlyph{clefs.kievan.do_change}	¶	\lilyGlyph{clefs.petrucci.f}
¶	\lilyGlyph{clefs.medicaea.do}	¶	\lilyGlyph{clefs.petrucci.f_change}
¶	\lilyGlyph{clefs.medicaea.do_change}	¶	\lilyGlyph{clefs.petrucci.g}
¶	\lilyGlyph{clefs.medicaea.fa}	¶	\lilyGlyph{clefs.petrucci.g_change}
¶	\lilyGlyph{clefs.medicaea.fa_change}	¶	\lilyGlyph{clefs.tab}
¶	\lilyGlyph{clefs.mensural.c}	¶	\lilyGlyph{clefs.tab_change}
¶	\lilyGlyph{clefs.mensural.c_change}	¶	\lilyGlyph{clefs.vaticana.do}
¶	\lilyGlyph{clefs.mensural.f}	¶	\lilyGlyph{clefs.vaticana.do_change}
¶	\lilyGlyph{clefs.mensural.f_change}	¶	\lilyGlyph{clefs.vaticana.fa}
¶	\lilyGlyph{clefs.mensural.g}	¶	\lilyGlyph{clefs.vaticana.fa_change}

\* *lilyglyp̄s* defines shorter names for these symbols. See Table 490.

TABLE 506: *lilyglyphs* Named Noteheads

```

\s \lilyGlyph{noteheads .d0doFunk}
\n \lilyGlyph{noteheads .d0fa}
\r \lilyGlyph{noteheads .d0faFunk}
\l \lilyGlyph{noteheads .d0faThin}
\d \lilyGlyph{noteheads .d0miFunk}
\w \lilyGlyph{noteheads .d0reFunk}
\t \lilyGlyph{noteheads .d0tiFunk}
\o \lilyGlyph{noteheads .d1do}
\p \lilyGlyph{noteheads .d1doFunk}
\m \lilyGlyph{noteheads .d1doThin}
\c \lilyGlyph{noteheads .d1doWalker}
\q \lilyGlyph{noteheads .d1fa}
\k \lilyGlyph{noteheads .d1faFunk}
\j \lilyGlyph{noteheads .d1faThin}
\z \lilyGlyph{noteheads .d1faWalker}
\g \lilyGlyph{noteheads .d1miFunk}
\h \lilyGlyph{noteheads .d1re}
\i \lilyGlyph{noteheads .d1reFunk}
\c \lilyGlyph{noteheads .d1reThin}
\l \lilyGlyph{noteheads .d1reWalker}
\y \lilyGlyph{noteheads .d1ti}
\x \lilyGlyph{noteheads .d1tiFunk}
\z \lilyGlyph{noteheads .d1tiThin}
\w \lilyGlyph{noteheads .d1tiWalker}
\q \lilyGlyph{noteheads .d1triangle}
\w \lilyGlyph{noteheads .d2do}
\p \lilyGlyph{noteheads .d2doFunk}
\m \lilyGlyph{noteheads .d2doThin}
\c \lilyGlyph{noteheads .d2doWalker}
\q \lilyGlyph{noteheads .d2fa}
\k \lilyGlyph{noteheads .d2faFunk}
\j \lilyGlyph{noteheads .d2faThin}
\z \lilyGlyph{noteheads .d2faWalker}
\l \lilyGlyph{noteheads .d2kievan}
\h \lilyGlyph{noteheads .d2re}
\i \lilyGlyph{noteheads .d2reFunk}
\z \lilyGlyph{noteheads .d2reThin}
\w \lilyGlyph{noteheads .d2reWalker}
\y \lilyGlyph{noteheads .d2ti}
\p \lilyGlyph{noteheads .d2tiFunk}
\z \lilyGlyph{noteheads .d2tiThin}
\w \lilyGlyph{noteheads .d2tiWalker}
\q \lilyGlyph{noteheads .d2triangle}

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```
♩ \lilyGlyph{noteheads.d3kievan}
♪ \lilyGlyph{noteheads.dM2}
♫ \lilyGlyph{noteheads.dM2blackmensural}
♬ \lilyGlyph{noteheads.dM2mensural}
♫ \lilyGlyph{noteheads.dM2neomensural}
♩ \lilyGlyph{noteheads.dM2semimensural}
♩ \lilyGlyph{noteheads.dM3blackmensural}
♩ \lilyGlyph{noteheads.dM3mensural}
♩ \lilyGlyph{noteheads.dM3neomensural}
♩ \lilyGlyph{noteheads.dM3semimensural}
♩ \lilyGlyph{noteheads.drM2mensural}
♩ \lilyGlyph{noteheads.drM2neomensural}
♩ \lilyGlyph{noteheads.drM2semimensural}
♩ \lilyGlyph{noteheads.drM3mensural}
♩ \lilyGlyph{noteheads.drM3neomensural}
♩ \lilyGlyph{noteheads.drM3semimensural}
♩ \lilyGlyph{noteheads.s0}
♪ \lilyGlyph{noteheads.s0blackmensural}
◆ \lilyGlyph{noteheads.s0blackpetrucci}
≈ \lilyGlyph{noteheads.s0cross}
◊ \lilyGlyph{noteheads.s0diamond}
△ \lilyGlyph{noteheads.s0do}
△ \lilyGlyph{noteheads.s0doThin}
△ \lilyGlyph{noteheads.s0doWalker}
△ \lilyGlyph{noteheads.s0faWalker}
◊ \lilyGlyph{noteheads.s0harmonic}
♦ \lilyGlyph{noteheads.s0kievan}
□ \lilyGlyph{noteheads.s0la}
□ \lilyGlyph{noteheads.s0laFunk}
□ \lilyGlyph{noteheads.s0laThin}
□ \lilyGlyph{noteheads.s0laWalker}
◊ \lilyGlyph{noteheads.s0mensural}
◊ \lilyGlyph{noteheads.s0mi}
◊ \lilyGlyph{noteheads.s0miMirror}
◊ \lilyGlyph{noteheads.s0miThin}
◊ \lilyGlyph{noteheads.s0miWalker}
◊ \lilyGlyph{noteheads.s0neomensural}
◊ \lilyGlyph{noteheads.s0petrucci}
¤ \lilyGlyph{noteheads.s0re}
¤ \lilyGlyph{noteheads.s0reThin}
¤ \lilyGlyph{noteheads.s0reWalker}
◻ \lilyGlyph{noteheads.s0slash}
օ \lilyGlyph{noteheads.s0sol}
```

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```

◦ \lilyGlyph{noteheads.s0solFunk}
◦ \lilyGlyph{noteheads.s0ti}
◦ \lilyGlyph{noteheads.s0tiThin}
◦ \lilyGlyph{noteheads.s0tiWalker}
▷ \lilyGlyph{noteheads.s0triangle}
◦ \lilyGlyph{noteheads.s1}
◆ \lilyGlyph{noteheads.s1blackpetrucci}
⊗ \lilyGlyph{noteheads.s1cross}
¤ \lilyGlyph{noteheads.s1diamond}
† \lilyGlyph{noteheads.s1kievan}
▬ \lilyGlyph{noteheads.s1la}
□ \lilyGlyph{noteheads.s1laFunk}
□ \lilyGlyph{noteheads.s1laThin}
▬ \lilyGlyph{noteheads.s1laWalker}
◦ \lilyGlyph{noteheads.s1mensural}
◦ \lilyGlyph{noteheads.s1mi}
◦ \lilyGlyph{noteheads.s1miMirror}
◦ \lilyGlyph{noteheads.s1miThin}
◦ \lilyGlyph{noteheads.s1miWalker}
◦ \lilyGlyph{noteheads.s1neomensural}
◦ \lilyGlyph{noteheads.s1petrucci}
// \lilyGlyph{noteheads.s1slash}
◦ \lilyGlyph{noteheads.s1sol}
◦ \lilyGlyph{noteheads.s1solFunk}
• \lilyGlyph{noteheads.s2}
◆ \lilyGlyph{noteheads.s2blackpetrucci}
× \lilyGlyph{noteheads.s2cross}
¤ \lilyGlyph{noteheads.s2diamond}
◆ \lilyGlyph{noteheads.s2harmonic}
▬ \lilyGlyph{noteheads.s2la}
▬ \lilyGlyph{noteheads.s2laFunk}
▬ \lilyGlyph{noteheads.s2laThin}
▬ \lilyGlyph{noteheads.s2laWalker}
◦ \lilyGlyph{noteheads.s2mensural}
◦ \lilyGlyph{noteheads.s2mi}
◦ \lilyGlyph{noteheads.s2miFunk}
◦ \lilyGlyph{noteheads.s2miMirror}
◦ \lilyGlyph{noteheads.s2miThin}
◦ \lilyGlyph{noteheads.s2miWalker}
◦ \lilyGlyph{noteheads.s2neomensural}
◦ \lilyGlyph{noteheads.s2petrucci}
/ \lilyGlyph{noteheads.s2slash}
• \lilyGlyph{noteheads.s2sol}
• \lilyGlyph{noteheads.s2solFunk}
⊗ \lilyGlyph{noteheads.s2xcircle}
▬ \lilyGlyph{noteheads.shufnagel.lpes}

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```

◆ \lilyGlyph{noteheads.shufnagel.punctum}
↑ \lilyGlyph{noteheads.shufnagel.virga}
¤ \lilyGlyph{noteheads.sM1}
■ \lilyGlyph{noteheads.sM1blackmensural}
□ \lilyGlyph{noteheads.sM1double}
☰ \lilyGlyph{noteheads.sM1kievan}
▢ \lilyGlyph{noteheads.sM1mensural}
▢ \lilyGlyph{noteheads.sM1neomensural}
▢ \lilyGlyph{noteheads.sM1semimensural}
▢ \lilyGlyph{noteheads.sM2blackligmensural}
▢ \lilyGlyph{noteheads.sM2kievan}
▢ \lilyGlyph{noteheads.sM2ligmensural}
▢ \lilyGlyph{noteheads.sM2semiligmensural}
▢ \lilyGlyph{noteheads.sM3blackligmensural}
▢ \lilyGlyph{noteheads.sM3ligmensural}
▢ \lilyGlyph{noteheads.sM3semiligmensural}
◆ \lilyGlyph{noteheads.smedicaea.inclinatum}
▪ \lilyGlyph{noteheads.smedicaea.punctum}
▪ \lilyGlyph{noteheads.smedicaea.rvirga}
▪ \lilyGlyph{noteheads.smedicaea.virga}
⊣ \lilyGlyph{noteheads.sr1kievan}
▢ \lilyGlyph{noteheads.srM1mensural}
▢ \lilyGlyph{noteheads.srM1neomensural}
▢ \lilyGlyph{noteheads.srM1semimensural}
▢ \lilyGlyph{noteheads.srM2ligmensural}
▢ \lilyGlyph{noteheads.srM2semiligmensural}
▢ \lilyGlyph{noteheads.srM3ligmensural}
▢ \lilyGlyph{noteheads.srM3semiligmensural}
· \lilyGlyph{noteheads.ssolesmes.auct.asc}
· \lilyGlyph{noteheads.ssolesmes.auct.desc}
· \lilyGlyph{noteheads.ssolesmes.incl.auctum}
· \lilyGlyph{noteheads.ssolesmes.incl.parvum}
· \lilyGlyph{noteheads.ssolesmes.oriscus}
· \lilyGlyph{noteheads.ssolesmes.stropha}
· \lilyGlyph{noteheads.ssolesmes.stropha.aucta}
· \lilyGlyph{noteheads.svaticana.cephalicus}
· \lilyGlyph{noteheads.svaticana.epiphonus}
· \lilyGlyph{noteheads.svaticana.inclinatum}
· \lilyGlyph{noteheads.svaticana.inner.cephalicus}
· \lilyGlyph{noteheads.svaticana.linea.punctum}
· \lilyGlyph{noteheads.svaticana.linea.punctum.cavum}
· \lilyGlyph{noteheads.svaticana.lpes}
· \lilyGlyph{noteheads.svaticana.plica}
· \lilyGlyph{noteheads.svaticana.punctum}
· \lilyGlyph{noteheads.svaticana.punctum.cavum}

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```
• \lilyGlyph{noteheads.svaticana.quilisma}
• \lilyGlyph{noteheads.svaticana.reverse.plica}
• \lilyGlyph{noteheads.svaticana.reverse.vplica}
• \lilyGlyph{noteheads.svaticana.upes}
• \lilyGlyph{noteheads.svaticana.vephonus}
• \lilyGlyph{noteheads.svaticana.vlpes}
• \lilyGlyph{noteheads.svaticana.vplica}
• \lilyGlyph{noteheads.svaticana.vupes}
• \lilyGlyph{noteheads.u0doFunk}
• \lilyGlyph{noteheads.u0fa}
• \lilyGlyph{noteheads.u0faFunk}
• \lilyGlyph{noteheads.u0faThin}
• \diamond \lilyGlyph{noteheads.u0miFunk}
• \triangleright \lilyGlyph{noteheads.u0reFunk}
• \triangleright \lilyGlyph{noteheads.u0tiFunk}
• \triangleright \lilyGlyph{noteheads.u1do}
• \lilyGlyph{noteheads.u1doFunk}
• \lilyGlyph{noteheads.u1doThin}
• \square \lilyGlyph{noteheads.u1doWalker}
• \lilyGlyph{noteheads.u1fa}
• \lilyGlyph{noteheads.u1faFunk}
• \lilyGlyph{noteheads.u1faThin}
• \lilyGlyph{noteheads.u1faWalker}
• \diamond \lilyGlyph{noteheads.u1miFunk}
• \lilyGlyph{noteheads.u1re}
• \lilyGlyph{noteheads.u1reFunk}
• \lilyGlyph{noteheads.u1reThin}
• \lilyGlyph{noteheads.u1reWalker}
• \diamond \lilyGlyph{noteheads.u1ti}
• \diamond \lilyGlyph{noteheads.u1tiFunk}
• \diamond \lilyGlyph{noteheads.u1tiThin}
• \triangleright \lilyGlyph{noteheads.u1tiWalker}
• \triangleright \lilyGlyph{noteheads.u1triangle}
• \lilyGlyph{noteheads.u2do}
• \lilyGlyph{noteheads.u2doFunk}
• \lilyGlyph{noteheads.u2doThin}
• \lilyGlyph{noteheads.u2doWalker}
• \lilyGlyph{noteheads.u2fa}
• \lilyGlyph{noteheads.u2faFunk}
• \lilyGlyph{noteheads.u2faThin}
• \lilyGlyph{noteheads.u2faWalker}
• \lilyGlyph{noteheads.u2kievan}
• \lilyGlyph{noteheads.u2re}
• \lilyGlyph{noteheads.u2reFunk}
• \lilyGlyph{noteheads.u2reThin}
• \lilyGlyph{noteheads.u2reWalker}
```

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```

• \lilyGlyph{noteheads.u2ti}
• \lilyGlyph{noteheads.u2tiFunk}
• \lilyGlyph{noteheads.u2tiThin}
• \lilyGlyph{noteheads.u2tiWalker}
► \lilyGlyph{noteheads.u2triangle}
▼ \lilyGlyph{noteheads.u3kievan}

▀ \lilyGlyph{noteheads.uM2}
▀▀ \lilyGlyph{noteheads.uM2blackmensural}
▀▀▀ \lilyGlyph{noteheads.uM2mensural}
▀▀▀▀ \lilyGlyph{noteheads.uM2neomensural}
▀▀▀▀▀ \lilyGlyph{noteheads.uM2semimensural}
▀▀▀▀▀▀ \lilyGlyph{noteheads.uM3blackmensural}
▀▀▀▀▀▀▀ \lilyGlyph{noteheads.uM3mensural}
▀▀▀▀▀▀▀ \lilyGlyph{noteheads.uM3neomensural}
▀▀▀▀▀▀▀▀ \lilyGlyph{noteheads.uM3semimensural}
▀▀▀▀▀▀▀▀▀ \lilyGlyph{noteheads.urM2mensural}
▀▀▀▀▀▀▀▀▀ \lilyGlyph{noteheads.urM2neomensural}
▀▀▀▀▀▀▀▀▀▀ \lilyGlyph{noteheads.urM2semimensural}
▀▀▀▀▀▀▀▀▀▀▀ \lilyGlyph{noteheads.urM3mensural}
▀▀▀▀▀▀▀▀▀▀▀ \lilyGlyph{noteheads.urM3neomensural}
▀▀▀▀▀▀▀▀▀▀▀▀ \lilyGlyph{noteheads.urM3semimensural}

```

TABLE 507: *lilyglypbs* Named Accordion Symbols

▀	\lilyGlyph{accordion.bayanbass}	▀▀	\lilyGlyph{accordion.oldEE}
▀▀	\lilyGlyph{accordion.discant}	▀▀▀	\lilyGlyph{accordion.pull}
.	\lilyGlyph{accordion.dot}	>	\lilyGlyph{accordion.push}
▀▀▀	\lilyGlyph{accordion.freebass}	▀▀▀▀	\lilyGlyph{accordion.stdbass}

*lilyglypbs* defines shorter names for all of these symbols except `\lilyGlyph{accordion.dot}`. See Table 498.

TABLE 508: *lilyglyphs* Named Accidentals

```

× \lilyGlyph{accidentals.doublesharp}*
♭ \lilyGlyph{accidentals.flat}*
↑♭ \lilyGlyph{accidentals.flat.arrowboth}
↓♭ \lilyGlyph{accidentals.flat.arrowdown}
↑♭ \lilyGlyph{accidentals.flat.arrowup}
♭\flat \lilyGlyph{accidentals.flat.slash}
♯\flat \lilyGlyph{accidentals.flat.slashslash}
♭♭ \lilyGlyph{accidentals.flatflat}*
♯\flat\flat \lilyGlyph{accidentals.flatflat.slash}
♭\flat\flat \lilyGlyph{accidentals.hufnagelM1}
※ \lilyGlyph{accidentals.kievan1}
♭\flat \lilyGlyph{accidentals.kievanM1}
( \lilyGlyph{accidentals.leftparen}
) \lilyGlyph{accidentals.medicaeaM1}
× \lilyGlyph{accidentals.mensural1}
♭ \lilyGlyph{accidentals.mensuralM1}
↓ \lilyGlyph{accidentals.mirroredflat}
↑ \lilyGlyph{accidentals.mirroredflat.backslash}
↓ \lilyGlyph{accidentals.mirroredflat.flat}
↑ \lilyGlyph{accidentals.natural}*
↑ \lilyGlyph{accidentals.natural.arrowboth}
↓ \lilyGlyph{accidentals.natural.arrowdown}
↑ \lilyGlyph{accidentals.natural.arrowup}
) \lilyGlyph{accidentals.rightparen}
♯ \lilyGlyph{accidentals.sharp}*
↑♯ \lilyGlyph{accidentals.sharp.arrowboth}*
↓♯ \lilyGlyph{accidentals.sharp.arrowdown}*
↑♯ \lilyGlyph{accidentals.sharp.arrowup}*
♯\sharp \lilyGlyph{accidentals.sharp.slashslash.stem}*
♯\sharp \lilyGlyph{accidentals.sharp.slashslash.stemstem}*
♯\sharp \lilyGlyph{accidentals.sharp.slashslashslash.stem}*
♯\sharp \lilyGlyph{accidentals.sharp.slashslashslash.stemstem}*
↓♯ \lilyGlyph{accidentals.vaticana0}
↓♯ \lilyGlyph{accidentals.vaticanaM1}

```

\* *lilyglyphs* defines shorter names for these symbols. See Table 492.

TABLE 509: *lilyglyphs* Named Arrowheads

► \lilyGlyph{arrowheads.close.01}	> \lilyGlyph{arrowheads.open.01}
◀ \lilyGlyph{arrowheads.close.0M1}	< \lilyGlyph{arrowheads.open.0M1}
▲ \lilyGlyph{arrowheads.close.11}	^ \lilyGlyph{arrowheads.open.11}
▼ \lilyGlyph{arrowheads.close.1M1}	▼ \lilyGlyph{arrowheads.open.1M1}

TABLE 510: *lilyglyphs* Named Alphanumerics and Punctuation

<b>0</b>	\lilyGlyph{zero}	<b>4</b>	\lilyGlyph{four}	<b>8</b>	\lilyGlyph{eight}
<b>1</b>	\lilyGlyph{one}	<b>5</b>	\lilyGlyph{five}	<b>9</b>	\lilyGlyph{nine}
<b>2</b>	\lilyGlyph{two}	<b>6</b>	\lilyGlyph{six}		
<b>3</b>	\lilyGlyph{three}	<b>7</b>	\lilyGlyph{seven}		
<b>f</b>	\lilyGlyph{f}	<b>p</b>	\lilyGlyph{p}	<i>s</i>	\lilyGlyph{s}
<b>m</b>	\lilyGlyph{m}	<b>r</b>	\lilyGlyph{r}	<i>z</i>	\lilyGlyph{z}
,	\lilyGlyph{comma}	.	\lilyGlyph{period}		
-	\lilyGlyph{hyphen}	+	\lilyGlyph{plus}		

See Table 494 for an alternative way to typeset dynamics letters. *lilyglyphs* additionally provides a \lilyText command that can be useful for typesetting groups of the preceding symbols. See the *lilyglyphs* documentation for more information.

TABLE 511: Miscellaneous *lilyglyphs* Named Musical Symbols

˘ \lilyGlyph{brackettips.down}	. \lilyGlyph{dots.dotvaticana}
˘ \lilyGlyph{brackettips.up}	˘ \lilyGlyph{ties.lyric.default}
. \lilyGlyph{dots.dot}	˘ \lilyGlyph{ties.lyric.short}
• \lilyGlyph{dots.dotkiev}	

# Chapter 8

## Gaming symbols

This chapter presents symbols related to games and gaming: playing-card suits, dice, and symbols used to represent pieces and moves in various games. Additional gaming symbols appear in Chapter 11, but those symbols are delivered by packages that provide minimal L<sup>A</sup>T<sub>E</sub>X support.

TABLE 512: L<sup>A</sup>T<sub>E</sub>X 2<sub><</sub> Playing-Card Suits

♣ \clubsuit ♦ \diamondsuit ♥ \heartsuit ♠ \spadesuit

TABLE 513: txfonts/pxfonts Playing-Card Suits

♣ \varclubsuit ♦ \vardiamondsuit ♥ \varheartsuit ♠ \varsuit

TABLE 514: MnSymbol Playing-Card Suits

♣ \clubsuit ♦ \diamondsuit ♥ \heartsuit ♠ \spadesuit

TABLE 515: fdsymbol Playing-Card Suits

♣ \clubsuit ♥ \heartsuit ♦ \vardiamondsuit  
♦ \diamondsuit ♠ \spadesuit ♥ \varheartsuit

TABLE 516: boisik Playing-Card Suits

♣ \clubsuit ♦ \diamondsuit ♥ \heartsuit ♠ \spadesuit

TABLE 517: stix Playing-Card Suits

$\clubsuit$	<code>\clubsuit</code>	$\heartsuit$	<code>\heartsuit</code>	$\clubsuit$	<code>\varclubsuit</code>	$\heartsuit$	<code>\varheartsuit</code>
$\diamondsuit$	<code>\diamondardsuit</code>	$\spadesuit$	<code>\spadesuit</code>	$\diamondsuit$	<code>\vardiamondsuit</code>	$\spadesuit$	<code>\varspadesuit</code>

TABLE 518: arev Playing-Card Suits

$\clubsuit$	<code>\varclub</code>	$\diamondsuit$	<code>\vardiamond</code>	$\heartsuit$	<code>\varheart</code>	$\spadesuit$	<code>\varspade</code>
-------------	-----------------------	----------------	--------------------------	--------------	------------------------	--------------	------------------------

TABLE 519: twemojis Playing-Card Suits

$\clubsuit$	<code>\twemoji{club suit}</code>	$\heartsuit$	<code>\twemoji{heart suit}</code>
$\diamondsuit$	<code>\twemoji{diamond suit}</code>	$\spadesuit$	<code>\twemoji{spade suit}</code>

Most `twemoji` symbols have multiple names. Only the most descriptive name for each symbol is shown in this table.

All `twemoji` symbols are implemented as PDF graphics, not with a font. See also the `hwemoji` package, which enables direct Unicode entry of emoji characters in pdfL<sup>A</sup>T<sub>E</sub>X; the `emoji` package, which provides a LuaL<sup>A</sup>T<sub>E</sub>X interface to different underlying emoji fonts; and the `emo` package, which uses a font if possible, otherwise PDF graphics .

TABLE 520: utfsym Playing-Card Suits

$\clubsuit$	<code>\usym{2660}</code>	$\diamondsuit$	<code>\usym{2662}</code>	$\clubsuit$	<code>\usym{2664}</code>	$\diamondsuit$	<code>\usym{2666}</code>
$\heartsuit$	<code>\usym{2661}</code>	$\spadesuit$	<code>\usym{2663}</code>	$\heartsuit$	<code>\usym{2665}</code>	$\spadesuit$	<code>\usym{2667}</code>

All `utfsym` symbols are implemented with TikZ graphics, not with a font. In addition to `\usym`, the `utfsym` package defines `\usymH`, which renders a symbol at a given height, and `\usymW`, which renders a symbol at a given width. See the `utfsym` documentation for more information.

TABLE 521: `utfsym` Playing Cards

■	<code>\usym{1F0A0}</code>	■	<code>\usym{1F0B7}</code>	■	<code>\usym{1F0CD}</code>	■	<code>\usym{1F0E3}</code>
♦	<code>\usym{1F0A1}</code>	♦	<code>\usym{1F0B8}</code>	♦	<code>\usym{1F0CE}</code>	♦	<code>\usym{1F0E4}</code>
♥	<code>\usym{1F0A2}</code>	♥	<code>\usym{1F0B9}</code>	♥	<code>\usym{1F0CF}</code>	♥	<code>\usym{1F0E5}</code>
♣	<code>\usym{1F0A3}</code>	♣	<code>\usym{1F0BA}</code>	♣	<code>\usym{1F0D1}</code>	♣	<code>\usym{1F0E6}</code>
♤	<code>\usym{1F0A4}</code>	♤	<code>\usym{1F0BB}</code>	♤	<code>\usym{1F0D2}</code>	♤	<code>\usym{1F0E7}</code>
♧	<code>\usym{1F0A5}</code>	♧	<code>\usym{1F0BC}</code>	♧	<code>\usym{1F0D3}</code>	♧	<code>\usym{1F0E8}</code>
♤	<code>\usym{1F0A6}</code>	♤	<code>\usym{1F0BD}</code>	♤	<code>\usym{1F0D4}</code>	♤	<code>\usym{1F0E9}</code>
♧	<code>\usym{1F0A7}</code>	♧	<code>\usym{1F0BE}</code>	♧	<code>\usym{1F0D5}</code>	♧	<code>\usym{1F0EA}</code>
♧	<code>\usym{1F0A8}</code>	♧	<code>\usym{1F0BF}</code>	♧	<code>\usym{1F0D6}</code>	♧	<code>\usym{1F0EB}</code>
♤	<code>\usym{1F0A9}</code>	♤	<code>\usym{1F0C1}</code>	♤	<code>\usym{1F0D7}</code>	♤	<code>\usym{1F0EC}</code>
♤	<code>\usym{1F0AA}</code>	♤	<code>\usym{1F0C2}</code>	♤	<code>\usym{1F0D8}</code>	♤	<code>\usym{1F0ED}</code>
♧	<code>\usym{1F0AB}</code>	♧	<code>\usym{1F0C3}</code>	♧	<code>\usym{1F0D9}</code>	♧	<code>\usym{1F0EE}</code>
♧	<code>\usym{1F0AC}</code>	♧	<code>\usym{1F0C4}</code>	♧	<code>\usym{1F0DA}</code>	♧	<code>\usym{1F0EF}</code>
♧	<code>\usym{1F0AD}</code>	♧	<code>\usym{1F0C5}</code>	♧	<code>\usym{1F0DB}</code>	♧	<code>\usym{1F0F0}</code>
♤	<code>\usym{1F0AE}</code>	♤	<code>\usym{1F0C6}</code>	♤	<code>\usym{1F0DC}</code>	♤	<code>\usym{1F0F1}</code>
♤	<code>\usym{1F0B1}</code>	♤	<code>\usym{1F0C7}</code>	♤	<code>\usym{1F0DD}</code>	♤	<code>\usym{1F0F2}</code>
♤	<code>\usym{1F0B2}</code>	♤	<code>\usym{1F0C8}</code>	♤	<code>\usym{1F0DE}</code>	♤	<code>\usym{1F0F3}</code>
♤	<code>\usym{1F0B3}</code>	♤	<code>\usym{1F0C9}</code>	♤	<code>\usym{1F0DF}</code>	♤	<code>\usym{1F0F4}</code>
♤	<code>\usym{1F0B4}</code>	♤	<code>\usym{1F0CA}</code>	♤	<code>\usym{1F0E0}</code>	♤	<code>\usym{1F0F5}</code>
♤	<code>\usym{1F0B5}</code>	♤	<code>\usym{1F0CB}</code>	♤	<code>\usym{1F0E1}</code>		
♤	<code>\usym{1F0B6}</code>	♤	<code>\usym{1F0CC}</code>	♤	<code>\usym{1F0E2}</code>		

All `utfsym` symbols are implemented with TikZ graphics, not with a font. In addition to `\usym`, the `utfsym` package defines `\usymH`, which renders a symbol at a given height, and `\usymW`, which renders a symbol at a given width. For example, “`\usymH{1F0BE}{36pt}`” produces



See the `utfsym` documentation for more information.

TABLE 522: `epsdice` Dice

□	<code>\epsdice{1}</code>	□	<code>\epsdice{3}</code>	□	<code>\epsdice{5}</code>
□	<code>\epsdice{2}</code>	□	<code>\epsdice{4}</code>	□	<code>\epsdice{6}</code>

TABLE 523: hhcount Dice

□ \fcdice{1} □ \fcdice{3} □ \fcdice{5}  
□ \fcdice{2} □ \fcdice{4} □ \fcdice{6}

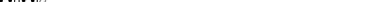
The `\fcdice` command accepts values larger than 6. For example, “`\fcdice{47}`” produces “”.

TABLE 524: stix Dice

<input type="checkbox"/>	\dicei	<input checked="" type="checkbox"/>	\diceiii	<input type="checkbox"/>	\dicev
<input checked="" type="checkbox"/>	\diceii	<input type="checkbox"/>	\diceiv	<input type="checkbox"/>	\dicevi

TABLE 525: ifsym Dice

	\Cube{1}		\Cube{3}		\Cube{5}
	\Cube{2}		\Cube{4}		\Cube{6}

TABLE 526: utfsym Dice

\usym{2680} \usym{2682} \usym{2684}  
\usym{2681} \usym{2683} \usym{2685}

All `utfsym` symbols are implemented with TikZ graphics, not with a font. In addition to `\usym`, the `utfsym` package defines `\usymH`, which renders a symbol at a given height, and `\usymW`, which renders a symbol at a given width. See the `utfsym` documentation for more information.

TABLE 527: fontawesome5 Dice

 \faDice	 \faDiceFive	 \faDiceSix
 \faDiceD20	 \faDiceFour	 \faDiceThree
 \faDiceD6	 \faDiceOne	 \faDiceTwo

TABLE 528: `utfsym` Domino Tiles

■ ■	\usym{1F030}	■ ■	\usym{1F049}	■ ■	\usym{1F062}	■ ■	\usym{1F07B}
□ □	\usym{1F031}	□ □	\usym{1F04A}	□ □	\usym{1F063}	□ □	\usym{1F07C}
□ ■	\usym{1F032}	□ ■	\usym{1F04B}	□ ■	\usym{1F064}	□ ■	\usym{1F07D}
■ □	\usym{1F033}	■ □	\usym{1F04C}	■ □	\usym{1F065}	■ □	\usym{1F07E}
□ ■	\usym{1F034}	□ ■	\usym{1F04D}	□ ■	\usym{1F066}	□ ■	\usym{1F07F}
■ ■	\usym{1F035}	■ ■	\usym{1F04E}	■ ■	\usym{1F067}	■ ■	\usym{1F080}
■ ■	\usym{1F036}	■ ■	\usym{1F04F}	■ ■	\usym{1F068}	■ ■	\usym{1F081}
■ ■	\usym{1F037}	■ ■	\usym{1F050}	■ ■	\usym{1F069}	■ ■	\usym{1F082}
□ □	\usym{1F038}	□ □	\usym{1F051}	□ □	\usym{1F06A}	□ □	\usym{1F083}
□ ■	\usym{1F039}	□ ■	\usym{1F052}	□ ■	\usym{1F06B}	□ ■	\usym{1F084}
■ □	\usym{1F03A}	■ □	\usym{1F053}	■ □	\usym{1F06C}	■ □	\usym{1F085}
□ ■	\usym{1F03B}	□ ■	\usym{1F054}	□ ■	\usym{1F06D}	□ ■	\usym{1F086}
■ ■	\usym{1F03C}	■ ■	\usym{1F055}	■ ■	\usym{1F06E}	■ ■	\usym{1F087}
■ ■	\usym{1F03D}	■ ■	\usym{1F056}	■ ■	\usym{1F06F}	■ ■	\usym{1F088}
■ ■	\usym{1F03E}	■ ■	\usym{1F057}	■ ■	\usym{1F070}	■ ■	\usym{1F089}
□ □	\usym{1F03F}	□ □	\usym{1F058}	□ □	\usym{1F071}	□ □	\usym{1F08A}
□ ■	\usym{1F040}	□ ■	\usym{1F059}	□ ■	\usym{1F072}	□ ■	\usym{1F08B}
■ □	\usym{1F041}	■ □	\usym{1F05A}	■ □	\usym{1F073}	■ □	\usym{1F08C}
■ ■	\usym{1F042}	■ ■	\usym{1F05B}	■ ■	\usym{1F074}	■ ■	\usym{1F08D}
■ ■	\usym{1F043}	■ ■	\usym{1F05C}	■ ■	\usym{1F075}	■ ■	\usym{1F08E}
■ ■	\usym{1F044}	■ ■	\usym{1F05D}	■ ■	\usym{1F076}	■ ■	\usym{1F08F}
■ ■	\usym{1F045}	■ ■	\usym{1F05E}	■ ■	\usym{1F077}	■ ■	\usym{1F090}
□ □	\usym{1F046}	□ □	\usym{1F05F}	□ □	\usym{1F078}	□ □	\usym{1F091}
□ ■	\usym{1F047}	□ ■	\usym{1F060}	□ ■	\usym{1F079}	□ ■	\usym{1F092}
■ □	\usym{1F048}	■ □	\usym{1F061}	■ □	\usym{1F07A}	■ □	\usym{1F093}

All `utfsym` symbols are implemented with `TikZ` graphics, not with a font. In addition to `\usym`, the `utfsym` package defines `\usymH`, which renders a symbol at a given height, and `\usymW`, which renders a symbol at a given width. For example, “`\usymH{1F089}{36pt}`” produces



See the `utfsym` documentation for more information.

TABLE 529: `utfsym` Mahjong Tiles

🀁	<code>\usym{1F000}</code>	🀂	<code>\usym{1F00B}</code>	🀃	<code>\usym{1F016}</code>	🀄	<code>\usym{1F021}</code>
🀃	<code>\usym{1F001}</code>	🀄	<code>\usym{1F00C}</code>	🀅	<code>\usym{1F017}</code>	🀆	<code>\usym{1F022}</code>
🀅	<code>\usym{1F002}</code>	🀆	<code>\usym{1F00D}</code>	🀇	<code>\usym{1F018}</code>	🀈	<code>\usym{1F023}</code>
🀇	<code>\usym{1F003}</code>	🀈	<code>\usym{1F00E}</code>	🀉	<code>\usym{1F019}</code>	🀊	<code>\usym{1F024}</code>
🀉	<code>\usym{1F004}</code>	🀊	<code>\usym{1F00F}</code>	🀋	<code>\usym{1F01A}</code>	🀌	<code>\usym{1F025}</code>
🀊	<code>\usym{1F005}</code>	🀋	<code>\usym{1F010}</code>	🀌	<code>\usym{1F01B}</code>	🀍	<code>\usym{1F026}</code>
🀌	<code>\usym{1F006}</code>	🀍	<code>\usym{1F011}</code>	🀎	<code>\usym{1F01C}</code>	🀏	<code>\usym{1F027}</code>
🀎	<code>\usym{1F007}</code>	🀏	<code>\usym{1F012}</code>	🀐	<code>\usym{1F01D}</code>	🀑	<code>\usym{1F028}</code>
🀏	<code>\usym{1F008}</code>	🀐	<code>\usym{1F013}</code>	🀑	<code>\usym{1F01E}</code>	🀒	<code>\usym{1F029}</code>
🀑	<code>\usym{1F009}</code>	🀒	<code>\usym{1F014}</code>	🀓	<code>\usym{1F01F}</code>	🀔	<code>\usym{1F02A}</code>
🀒	<code>\usym{1F00A}</code>	🀓	<code>\usym{1F015}</code>	🀔	<code>\usym{1F020}</code>	🀕	<code>\usym{1F02B}</code>

All `utfsym` symbols are implemented with TikZ graphics, not with a font. In addition to `\usym`, the `utfsym` package defines `\usymH`, which renders a symbol at a given height, and `\usymW`, which renders a symbol at a given width. For example, “`\usymH{1F00B}{36pt}`” produces



See the `utfsym` documentation for more information.

TABLE 530: `utfsym` Chess Pieces

♚	<code>\usym{2654}</code>	♝	<code>\usym{2657}</code>	♛	<code>\usym{265A}</code>	♜	<code>\usym{265D}</code>
♚	<code>\usym{2655}</code>	♝	<code>\usym{2658}</code>	♛	<code>\usym{265B}</code>	♜	<code>\usym{265E}</code>
♞	<code>\usym{2656}</code>	♞	<code>\usym{2659}</code>	♞	<code>\usym{265C}</code>	♞	<code>\usym{265F}</code>

All `utfsym` symbols are implemented with TikZ graphics, not with a font. In addition to `\usym`, the `utfsym` package defines `\usymH`, which renders a symbol at a given height, and `\usymW`, which renders a symbol at a given width. See the `utfsym` documentation for more information.

TABLE 531: *skak* Chess Informator Symbols

⊤	\bbetter	○	\doublepawns	○○	\seppawns
-+	\bdecisive	⊥	\ending	O-O	\shortcastling
▷	\betteris	=	\equal	⊕	\timelimit
◩	\bishoppair	⇒	\file	∞	\unclear
⊜	\upperhand	»	\kside	○○	\unitedpawns
×	\capturesymbol	O-O-O	\longcastling	R	\various
O	\castlingchar	X	\markera	±	\wbetter
-	\castlinghyphen	O	\markerb	+-	\wdecisive
田	\centre	#	\mate	×	\weakpt
+	\checkssymbol	>	\morepawns	└	\with
RR	\chesscomment	○	\moreroom	→	\withattack
	\chessetc	N	\novelty	△	\withidea
—	\chesssee	□	\onlymove	↑	\withinit
≈	\compensation	■	\opposbishops	└	\without
↶	\counterplay	♂	\passedpawn	±	\upperhand
⟳	\devantage	≪	\qside	○	\zugzwang
↗	\diagonal	■	\samebishops		

TABLE 532: *skak* Chess Pieces and Chessboard Squares

	\BlackBishopOnBlack		\BlackRookOnBlack		\WhiteKingOnBlack
	\BlackBishopOnWhite		\BlackRookOnWhite		\WhiteKingOnWhite
	\BlackEmptySquare		\symbishop		\WhiteKnightOnBlack
	\BlackKingOnBlack		\symking		\WhiteKnightOnWhite
	\BlackKingOnWhite		\symknight		\WhitePawnOnBlack
	\BlackKnightOnBlack		\sympawn		\WhitePawnOnWhite
	\BlackKnightOnWhite		\symqueen		\WhiteQueenOnBlack
	\BlackPawnOnBlack		\symrook		\WhiteQueenOnWhite
	\BlackPawnOnWhite		\WhiteBishopOnBlack		\WhiteRookOnBlack
	\BlackQueenOnBlack		\WhiteBishopOnWhite		\WhiteRookOnWhite
	\BlackQueenOnWhite		\WhiteEmptySquare		

The *skak* package also provides commands for drawing complete chessboards. See the *skak* documentation for more information.

TABLE 533: fontawesome5 Chess Pieces and Chessboards

	\faChess		\faChessKing		\faChessQueen
	\faChessBishop		\faChessKnight		\faChessRook
	\faChessBoard		\faChessPawn		

TABLE 534: igo Go Symbols

	\blackstone[\igocircle]		\whitestone[\igocircle]
	\blackstone[\igocross]		\whitestone[\igocross]
	\blackstone[\igonone]		\whitestone[\igonone]
	\blackstone[\igosquare]		\whitestone[\igosquare]
	\blackstone[\igotriangle]		\whitestone[\igotriangle]

In addition to the symbols shown above, igo's \blackstone and \whitestone commands accept numbers from 1 to 99 and display them circled as ①, ②, ③, ..., ⑨9 and ①, ②, ③, ..., ⑨9, respectively.

The igo package is intended to typeset complete Go boards (goban). See the igo documentation for more information.

TABLE 535: go Go Symbols

	\botborder		\lftbotcorner		\rttopcorner
	\empty		\lfttopcorner		\square
	\hoshi		\rborder		\topborder
	\lftborder		\rtbotcorner		\triangle

In addition to the board fragments and stones shown above, go's \black and \white commands accept numbers from 1 to 253 and display them circled as ①, ②, ③, ..., ⑬ and ①, ②, ③, ..., ⑬, respectively. \black and \white additionally accept \square and \triangle as arguments, producing ④ and ⑤ for \black and ⑥ and ⑦ for \white.

The go package is intended to typeset complete Go boards (goban). See the go documentation for more information.

TABLE 536: fontawesome5 Sports

	\faBaseballBall		\faFootballBall		\faSkiing
	\faBasketballBall		\faFutbol		\faSkiingNordic
	\faBiking		\faFutbol[regular]		\faSnowboarding
	\faBowlingBall		\faGolfBall		\faSwimmer
	\faDribbble		\faHockeyPuck		\faTableTennis
	\faDribbbleSquare		\faQuidditch		\faVolleyballBall
	\faDumbbell		\faSkating		

TABLE 537: `utfsym` Games and Sports

🂱	<code>\usym{1F3AE}</code>	🂲	<code>\usym{1F3BF}</code>	🂳	<code>\usym{1F3C6}</code>	🂴	<code>\usym{1F3CF}</code>
🂳	<code>\usym{1F3AF}</code>	🂵	<code>\usym{1F3C0}</code>	🂶	<code>\usym{1F3C7}</code>	🂷	<code>\usym{1F3D0}</code>
🂷	<code>\usym{1F3B0}</code>	🂸	<code>\usym{1F3C1}</code>	🂹	<code>\usym{1F3C8}</code>	🂺	<code>\usym{1F3D1}</code>
🂹	<code>\usym{1F3B1}</code>	🂻	<code>\usym{1F3C2}</code>	🂻	<code>\usym{1F3C9}</code>	🂻	<code>\usym{1F3D2}</code>
🂻	<code>\usym{1F3B2}</code>	🂼	<code>\usym{1F3C3}</code>	🂽	<code>\usym{1F3CA}</code>	🂽	<code>\usym{1F3D3}</code>
🂽	<code>\usym{1F3B3}</code>	🂾	<code>\usym{1F3C4}</code>	🂾	<code>\usym{1F3CB}</code>	🂾	<code>\usym{1F3F8}</code>
🂾	<code>\usym{1F3BE}</code>	🂿	<code>\usym{1F3C5}</code>	🂿	<code>\usym{1F3CC}</code>	🂿	<code>\usym{1F3F9}</code>

All `utfsym` symbols are implemented with TikZ graphics, not with a font. In addition to `\usym`, the `utfsym` package defines `\usymH`, which renders a symbol at a given height, and `\usymW`, which renders a symbol at a given width. For example, “`\usymH{1F3B0}{36pt}`” produces



See the `utfsym` documentation for more information.

## Chapter 9

# Geographical Symbols

The symbols in this chapter relate in some manner to geography. In particular, the following tables present both maps and national and regional flags.

TABLE 538: countriesofeurope Country Maps

	\Albania		\Latvia
	\Andorra		\Liechtenstein
	\Austria		\Lithuania
	\Belarus		\Luxembourg
	\Belgium		\Macedonia
	\Bosnia		\Malta
	\Bulgaria		\Moldova
	\Croatia		\Montenegro
	\Czechia		\Netherlands

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The preceding commands work only when the `CountriesOfEurope` font family is active. For convenience, the package defines a `\countriesofeuropefamily` command that switches to that font family.

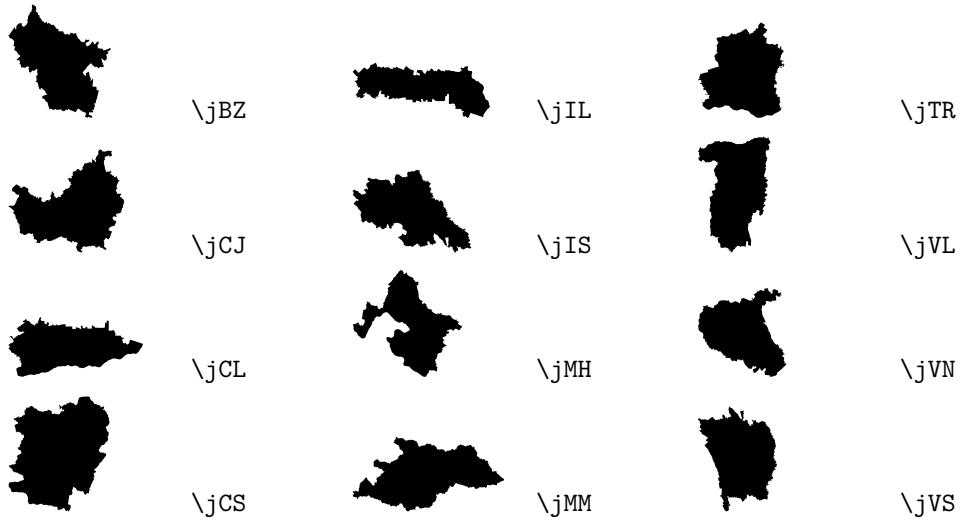
By default, countries are drawn in the current font size. Hence, “`\countriesofeuropefamily\France`” draws a nearly unrecognizable “”. For clarity of presentation, Table 538 scales each glyph to 72 pt. via an explicit `\fontsize{72}{72}`. An alternative is to specify the `scaled` package option to scale all country glyphs by a given factor of the font size.

TABLE 539: rojud Maps of Romanian Counties



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The preceding commands work only when the `rojud` font family is active. Use the OT1 font encoding in `pdflATeX` and the TU font encoding in `XeLATEX`. (`rojud` requires one of those two `TeX` engines.) For example, “`\usefont{OT1}{rojud}{m}{n}\jBI`” draws Bucharest.<sup>a</sup>

<sup>a</sup>technically a municipality, not a county

TABLE 540: `euflag` European Union Flag



The `\euflag` flag is drawn using the `LATeX picture` environment.

TABLE 541: `worldflags` Flags of Sovereign States

	<code>\worldflag{AD}</code>		<code>\worldflag{EC}</code>		<code>\worldflag{LC}</code>		<code>\worldflag{RW}</code>
	<code>\worldflag{AE}</code>		<code>\worldflag{EE}</code>		<code>\worldflag{LI}</code>		<code>\worldflag{SA}</code>
	<code>\worldflag{AF}</code>		<code>\worldflag{EG}</code>		<code>\worldflag{LK}</code>		<code>\worldflag{SB}</code>
	<code>\worldflag{AG}</code>		<code>\worldflag{ER}</code>		<code>\worldflag{LR}</code>		<code>\worldflag{SC}</code>
	<code>\worldflag{AL}</code>		<code>\worldflag{ES}</code>		<code>\worldflag{LS}</code>		<code>\worldflag{SD}</code>
	<code>\worldflag{AM}</code>		<code>\worldflag{ET}</code>		<code>\worldflag{LT}</code>		<code>\worldflag{SE}</code>
	<code>\worldflag{AO}</code>		<code>\worldflag{FI}</code>		<code>\worldflag{LU}</code>		<code>\worldflag{SG}</code>
	<code>\worldflag{AR}</code>		<code>\worldflag{FJ}</code>		<code>\worldflag{LV}</code>		<code>\worldflag{SI}</code>
	<code>\worldflag{AT}</code>		<code>\worldflag{FM}</code>		<code>\worldflag{LY}</code>		<code>\worldflag{SK}</code>
	<code>\worldflag{AU}</code>		<code>\worldflag{FR}</code>		<code>\worldflag{MA}</code>		<code>\worldflag{SL}</code>
	<code>\worldflag{AZ}</code>		<code>\worldflag{GA}</code>		<code>\worldflag{MD}</code>		<code>\worldflag{SM}</code>
	<code>\worldflag{BA}</code>		<code>\worldflag{GB}</code>		<code>\worldflag{ME}</code>		<code>\worldflag{SN}</code>
	<code>\worldflag{BB}</code>		<code>\worldflag{GD}</code>		<code>\worldflag{MG}</code>		<code>\worldflag{SO}</code>
	<code>\worldflag{BD}</code>		<code>\worldflag{GE}</code>		<code>\worldflag{MH}</code>		<code>\worldflag{SR}</code>
	<code>\worldflag{BE}</code>		<code>\worldflag{GH}</code>		<code>\worldflag{MK}</code>		<code>\worldflag{SS}</code>
	<code>\worldflag{BF}</code>		<code>\worldflag{GM}</code>		<code>\worldflag{ML}</code>		<code>\worldflag{ST}</code>
	<code>\worldflag{BG}</code>		<code>\worldflag{GN}</code>		<code>\worldflag{MM}</code>		<code>\worldflag{SV}</code>
	<code>\worldflag{BH}</code>		<code>\worldflag{GQ}</code>		<code>\worldflag{MN}</code>		<code>\worldflag{SY}</code>
	<code>\worldflag{BI}</code>		<code>\worldflag{GR}</code>		<code>\worldflag{MR}</code>		<code>\worldflag{SZ}</code>
	<code>\worldflag{BJ}</code>		<code>\worldflag{GT}</code>		<code>\worldflag{MT}</code>		<code>\worldflag{TD}</code>
	<code>\worldflag{BN}</code>		<code>\worldflag{GW}</code>		<code>\worldflag{MU}</code>		<code>\worldflag{TG}</code>
	<code>\worldflag{BO}</code>		<code>\worldflag{GY}</code>		<code>\worldflag{MV}</code>		<code>\worldflag{TH}</code>
	<code>\worldflag{BR}</code>		<code>\worldflag{HN}</code>		<code>\worldflag{MW}</code>		<code>\worldflag{TJ}</code>
	<code>\worldflag{BS}</code>		<code>\worldflag{HR}</code>		<code>\worldflag{MX}</code>		<code>\worldflag{TL}</code>
	<code>\worldflag{BT}</code>		<code>\worldflag{HT}</code>		<code>\worldflag{MY}</code>		<code>\worldflag{TM}</code>
	<code>\worldflag{BW}</code>		<code>\worldflag{HU}</code>		<code>\worldflag{MZ}</code>		<code>\worldflag{TN}</code>
	<code>\worldflag{BY}</code>		<code>\worldflag{ID}</code>		<code>\worldflag{NA}</code>		<code>\worldflag{TO}</code>
	<code>\worldflag{BZ}</code>		<code>\worldflag{IE}</code>		<code>\worldflag{NE}</code>		<code>\worldflag{TR}</code>
	<code>\worldflag{CA}</code>		<code>\worldflag{IL}</code>		<code>\worldflag{NG}</code>		<code>\worldflag{TT}</code>
	<code>\worldflag{CD}</code>		<code>\worldflag{IN}</code>		<code>\worldflag{NI}</code>		<code>\worldflag{TV}</code>
	<code>\worldflag{CF}</code>		<code>\worldflag{IQ}</code>		<code>\worldflag{NL}</code>		<code>\worldflag{TW}</code>
	<code>\worldflag{CG}</code>		<code>\worldflag{IR}</code>		<code>\worldflag{NO}</code>		<code>\worldflag{TZ}</code>
	<code>\worldflag{CH}</code>		<code>\worldflag{IS}</code>		<code>\worldflag{NP}</code>		<code>\worldflag{UA}</code>
	<code>\worldflag{CI}</code>		<code>\worldflag{IT}</code>		<code>\worldflag{NR}</code>		<code>\worldflag{UG}</code>

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	\worldflag{CK}		\worldflag{JM}		\worldflag{NZ}		\worldflag{US}
	\worldflag{CL}		\worldflag{JO}		\worldflag{OM}		\worldflag{UY}
	\worldflag{CM}		\worldflag{JP}		\worldflag{PA}		\worldflag{UZ}
	\worldflag{CN}		\worldflag{KE}		\worldflag{PE}		\worldflag{VA}
	\worldflag{CO}		\worldflag{KG}		\worldflag{PG}		\worldflag{VC}
	\worldflag{CR}		\worldflag{KH}		\worldflag{PH}		\worldflag{VE}
	\worldflag{CU}		\worldflag{KI}		\worldflag{PK}		\worldflag{VN}
	\worldflag{CV}		\worldflag{KM}		\worldflag{PL}		\worldflag{VU}
	\worldflag{CY}		\worldflag{KN}		\worldflag{PS}		\worldflag{WS}
	\worldflag{CZ}		\worldflag{KO}		\worldflag{PT}		\worldflag{YE}
	\worldflag{DE}		\worldflag{KP}		\worldflag{PW}		\worldflag{ZA}
	\worldflag{DJ}		\worldflag{KR}		\worldflag{PY}		\worldflag{ZM}
	\worldflag{DK}		\worldflag{KW}		\worldflag{QA}		\worldflag{ZW}
	\worldflag{DM}		\worldflag{KZ}		\worldflag{RO}		
	\worldflag{DO}		\worldflag{LA}		\worldflag{RS}		
	\worldflag{DZ}		\worldflag{LB}		\worldflag{RU}		

All `worldflags` symbols are implemented with TikZ graphics, not with a font. The package provides a number of options for controlling flag size and style. See the `worldflags` documentation for more information.

TABLE 542: `worldflags` Flags of Non-Sovereign Countries and Territories

	\worldflag{Abkhazia}		\worldflag{GF}		\worldflag{PR}
	\worldflag{AQ}		\worldflag{GG}		\worldflag{RE}
	\worldflag{Artsakh}		\worldflag{GI}		\worldflag{Saba}
	\worldflag{AX}		\worldflag{GL}		\worldflag{Somaliland}
	\worldflag{Bonaire}		\worldflag{IM}		\worldflag{StEustatius}
	\worldflag{EH}		\worldflag{JE}		\worldflag{Tibet}
	\worldflag{FO}		\worldflag{NU}		\worldflag{Transnistria}

All `worldflags` symbols are implemented with TikZ graphics, not with a font. The package provides a number of options for controlling flag size and style. See the `worldflags` documentation for more information.

TABLE 543: `worldflags` Flags of Austrian Federal States

	<code>\worldflag{AT-B}</code>		<code>\worldflag{AT-O}</code>		<code>\worldflag{AT-T}</code>
	<code>\worldflag{AT-K}</code>		<code>\worldflag{AT-S}</code>		<code>\worldflag{AT-V}</code>
	<code>\worldflag{AT-N}</code>		<code>\worldflag{AT-St}</code>		<code>\worldflag{AT-W}</code>

All `worldflags` symbols are implemented with TikZ graphics, not with a font. The package provides a number of options for controlling flag size and style. See the `worldflags` documentation for more information.

TABLE 544: `twemojis` Flags

	<code>\twemoji{flag: Åland Islands}</code>		<code>\twemoji{flag: Lesotho}</code>
	<code>\twemoji{flag: Afghanistan}</code>		<code>\twemoji{flag: Liberia}</code>
	<code>\twemoji{flag: Albania}</code>		<code>\twemoji{flag: Libya}</code>
	<code>\twemoji{flag: Algeria}</code>		<code>\twemoji{flag: Liechtenstein}</code>
	<code>\twemoji{flag: American Samoa}</code>		<code>\twemoji{flag: Lithuania}</code>
	<code>\twemoji{flag: Andorra}</code>		<code>\twemoji{flag: Luxembourg}</code>
	<code>\twemoji{flag: Angola}</code>		<code>\twemoji{flag: Macao SAR China}</code>
	<code>\twemoji{flag: Anguilla}</code>		<code>\twemoji{flag: Madagascar}</code>
	<code>\twemoji{flag: Antarctica}</code>		<code>\twemoji{flag: Malawi}</code>
	<code>\twemoji{flag: Antigua &amp; Barbuda}</code>		<code>\twemoji{flag: Malaysia}</code>
	<code>\twemoji{flag: Argentina}</code>		<code>\twemoji{flag: Maldives}</code>
	<code>\twemoji{flag: Armenia}</code>		<code>\twemoji{flag: Mali}</code>
	<code>\twemoji{flag: Aruba}</code>		<code>\twemoji{flag: Malta}</code>
	<code>\twemoji{flag: Ascension Island}</code>		<code>\twemoji{flag: Marshall Islands}</code>
	<code>\twemoji{flag: Australia}</code>		<code>\twemoji{flag: Martinique}</code>
	<code>\twemoji{flag: Austria}</code>		<code>\twemoji{flag: Mauritania}</code>
	<code>\twemoji{flag: Azerbaijan}</code>		<code>\twemoji{flag: Mauritius}</code>
	<code>\twemoji{flag: Bahamas}</code>		<code>\twemoji{flag: Mayotte}</code>
	<code>\twemoji{flag: Bahrain}</code>		<code>\twemoji{flag: Mexico}</code>
	<code>\twemoji{flag: Bangladesh}</code>		<code>\twemoji{flag: Micronesia}</code>
	<code>\twemoji{flag: Barbados}</code>		<code>\twemoji{flag: Moldova}</code>
	<code>\twemoji{flag: Belarus}</code>		<code>\twemoji{flag: Monaco}</code>
	<code>\twemoji{flag: Belgium}</code>		<code>\twemoji{flag: Mongolia}</code>
	<code>\twemoji{flag: Belize}</code>		<code>\twemoji{flag: Montenegro}</code>
	<code>\twemoji{flag: Benin}</code>		<code>\twemoji{flag: Montserrat}</code>
	<code>\twemoji{flag: Bermuda}</code>		<code>\twemoji{flag: Morocco}</code>
	<code>\twemoji{flag: Bhutan}</code>		<code>\twemoji{flag: Mozambique}</code>
	<code>\twemoji{flag: Bolivia}</code>		<code>\twemoji{flag: Myanmar (Burma)}</code>
	<code>\twemoji{flag: Bosnia &amp; Herzegovina}</code>		<code>\twemoji{flag: Namibia}</code>

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-  \twemoji{flag: Botswana}
-  \twemoji{flag: Bouvet Island}
-  \twemoji{flag: Brazil}
-  \twemoji{flag: British Indian Ocean Territory}
-  \twemoji{flag: British Virgin Islands}
-  \twemoji{flag: Brunei}
-  \twemoji{flag: Bulgaria}
-  \twemoji{flag: Burkina Faso}
-  \twemoji{flag: Burundi}
-  \twemoji{flag: Cambodia}
-  \twemoji{flag: Cameroon}
-  \twemoji{flag: Canada}
-  \twemoji{flag: Canary Islands}
-  \twemoji{flag: Cape Verde}
-  \twemoji{flag: Caribbean Netherlands}
-  \twemoji{flag: Cayman Islands}
-  \twemoji{flag: Central African Republic}
-  \twemoji{flag: Ceuta & Melilla}
-  \twemoji{flag: Chad}
-  \twemoji{flag: Chile}
-  \twemoji{flag: China}
-  \twemoji{flag: Christmas Island}
-  \twemoji{flag: Clipperton Island}
-  \twemoji{flag: Cocos (Keeling) Islands}
-  \twemoji{flag: Colombia}
-  \twemoji{flag: Comoros}
-  \twemoji{flag: Congo - Brazzaville}
-  \twemoji{flag: Congo - Kinshasa}
-  \twemoji{flag: Cook Islands}
-  \twemoji{flag: Costa Rica}
-  \twemoji{flag: Croatia}
-  \twemoji{flag: Cuba}
-  \twemoji{flag: Curaçao}
-  \twemoji{flag: Cyprus}
-  \twemoji{flag: Czechia}
-  \twemoji{flag: Côte d'Ivoire}
-  \twemoji{flag: Denmark}
-  \twemoji{flag: Diego Garcia}
-  \twemoji{flag: Djibouti}
-  \twemoji{flag: Nauru}
-  \twemoji{flag: Nepal}
-  \twemoji{flag: Netherlands}
-  \twemoji{flag: New Caledonia}
-  \twemoji{flag: New Zealand}
-  \twemoji{flag: Nicaragua}
-  \twemoji{flag: Nigeria}
-  \twemoji{flag: Niger}
-  \twemoji{flag: Niue}
-  \twemoji{flag: Norfolk Island}
-  \twemoji{flag: North Korea}
-  \twemoji{flag: North Macedonia}
-  \twemoji{flag: Northern Mariana Islands}
-  \twemoji{flag: Norway}
-  \twemoji{flag: Oman}
-  \twemoji{flag: Pakistan}
-  \twemoji{flag: Palau}
-  \twemoji{flag: Palestinian Territories}
-  \twemoji{flag: Panama}
-  \twemoji{flag: Papua New Guinea}
-  \twemoji{flag: Paraguay}
-  \twemoji{flag: Peru}
-  \twemoji{flag: Philippines}
-  \twemoji{flag: Pitcairn Islands}
-  \twemoji{flag: Poland}
-  \twemoji{flag: Portugal}
-  \twemoji{flag: Puerto Rico}
-  \twemoji{flag: Qatar}
-  \twemoji{flag: Romania}
-  \twemoji{flag: Russia}
-  \twemoji{flag: Rwanda}
-  \twemoji{flag: Réunion}
-  \twemoji{flag: Samoa}
-  \twemoji{flag: San Marino}
-  \twemoji{flag: Saudi Arabia}
-  \twemoji{flag: Scotland}
-  \twemoji{flag: Senegal}
-  \twemoji{flag: Serbia}
-  \twemoji{flag: Seychelles}

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- DK \twemoji{flag: Dominican Republic}
- DN \twemoji{flag: Dominica}
- EC \twemoji{flag: Ecuador}
- EG \twemoji{flag: Egypt}
- ES \twemoji{flag: El Salvador}
- EN \twemoji{flag: England}
- EG \twemoji{flag: Equatorial Guinea}
- ER \twemoji{flag: Eritrea}
- EE \twemoji{flag: Estonia}
- ET \twemoji{flag: Eswatini}
- ET \twemoji{flag: Ethiopia}
- EU \twemoji{flag: European Union}
- FK \twemoji{flag: Falkland Islands}
- FO \twemoji{flag: Faroe Islands}
- FJ \twemoji{flag: Fiji}
- FI \twemoji{flag: Finland}
- FR \twemoji{flag: France}
- GF \twemoji{flag: French Guiana}
- PF \twemoji{flag: French Polynesia}
- TF \twemoji{flag: French Southern Territories}
- GA \twemoji{flag: Gabon}
- GM \twemoji{flag: Gambia}
- GE \twemoji{flag: Georgia}
- DE \twemoji{flag: Germany}
- GH \twemoji{flag: Ghana}
- GT \twemoji{flag: Gibraltar}
- GR \twemoji{flag: Greece}
- GL \twemoji{flag: Greenland}
- GN \twemoji{flag: Grenada}
- GP \twemoji{flag: Guadeloupe}
- GU \twemoji{flag: Guam}
- GT \twemoji{flag: Guatemala}
- GG \twemoji{flag: Guernsey}
- GB \twemoji{flag: Guinea-Bissau}
- GN \twemoji{flag: Guinea}
- GY \twemoji{flag: Guyana}
- HT \twemoji{flag: Haiti}
- EH \twemoji{flag: Heard & McDonald Islands}
- HN \twemoji{flag: Honduras}
- HK \twemoji{flag: Hong Kong SAR China}
- SL \twemoji{flag: Sierra Leone}
- SG \twemoji{flag: Singapore}
- SM \twemoji{flag: Sint Maarten}
- SK \twemoji{flag: Slovakia}
- SV \twemoji{flag: Slovenia}
- SI \twemoji{flag: Solomon Islands}
- SO \twemoji{flag: Somalia}
- ZA \twemoji{flag: South Africa}
- SG \twemoji{flag: South Georgia & South Sandwich Islands}
- SK \twemoji{flag: South Korea}
- SD \twemoji{flag: South Sudan}
- ES \twemoji{flag: Spain}
- SL \twemoji{flag: Sri Lanka}
- SH \twemoji{flag: St. Barthélemy}
- SH \twemoji{flag: St. Helena}
- KN \twemoji{flag: St. Kitts & Nevis}
- LC \twemoji{flag: St. Lucia}
- MF \twemoji{flag: St. Martin}
- PM \twemoji{flag: St. Pierre & Miquelon}
- VC \twemoji{flag: St. Vincent & Grenadines}
- SD \twemoji{flag: Sudan}
- SR \twemoji{flag: Suriname}
- SJ \twemoji{flag: Svalbard & Jan Mayen}
- SE \twemoji{flag: Sweden}
- CH \twemoji{flag: Switzerland}
- SY \twemoji{flag: Syria}
- ST \twemoji{flag: São Tomé & Príncipe}
- TW \twemoji{flag: Taiwan}
- TJ \twemoji{flag: Tajikistan}
- TZ \twemoji{flag: Tanzania}
- TH \twemoji{flag: Thailand}
- TL \twemoji{flag: Timor-Leste}
- TG \twemoji{flag: Togo}
- TK \twemoji{flag: Tokelau}
- TO \twemoji{flag: Tonga}
- TR \twemoji{flag: Trinidad & Tobago}
- TC \twemoji{flag: Tristan da Cunha}
- TN \twemoji{flag: Tunisia}
- TR \twemoji{flag: Turkey}
- TM \twemoji{flag: Turkmenistan}

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 \twemoji{flag: Hungary}	 \twemoji{flag: Turks & Caicos Islands}
 \twemoji{flag: Iceland}	 \twemoji{flag: Tuvalu}
 \twemoji{flag: India}	 \twemoji{flag: U.S. Outlying Islands}
 \twemoji{flag: Indonesia}	 \twemoji{flag: U.S. Virgin Islands}
 \twemoji{flag: Iran}	 \twemoji{flag: Uganda}
 \twemoji{flag: Iraq}	 \twemoji{flag: Ukraine}
 \twemoji{flag: Ireland}	 \twemoji{flag: United Arab Emirates}
 \twemoji{flag: Isle of Man}	 \twemoji{flag: United Kingdom}
 \twemoji{flag: Israel}	 \twemoji{flag: United Nations}
 \twemoji{flag: Italy}	 \twemoji{flag: United States}
 \twemoji{flag: Jamaica}	 \twemoji{flag: Uruguay}
 \twemoji{flag: Japan}	 \twemoji{flag: Uzbekistan}
 \twemoji{flag: Jersey}	 \twemoji{flag: Vanuatu}
 \twemoji{flag: Jordan}	 \twemoji{flag: Vatican City}
 \twemoji{flag: Kazakhstan}	 \twemoji{flag: Venezuela}
 \twemoji{flag: Kenya}	 \twemoji{flag: Vietnam}
 \twemoji{flag: Kiribati}	 \twemoji{flag: Wales}
 \twemoji{flag: Kosovo}	 \twemoji{flag: Wallis & Futuna}
 \twemoji{flag: Kuwait}	 \twemoji{flag: Western Sahara}
 \twemoji{flag: Kyrgyzstan}	 \twemoji{flag: Yemen}
 \twemoji{flag: Laos}	 \twemoji{flag: Zambia}
 \twemoji{flag: Latvia}	 \twemoji{flag: Zimbabwe}
 \twemoji{flag: Lebanon}	

Most twemojis symbols have multiple names. Only the most descriptive name for each symbol is shown in this table.

All twemojis symbols are implemented as PDF graphics, not with a font. See also the `hwemoji` package, which enables direct Unicode entry of emoji characters in pdfL<sup>A</sup>T<sub>E</sub>X; the `emoji` package, which provides a L<sup>A</sup>T<sub>E</sub>X interface to different underlying emoji fonts; and the `emo` package, which uses a font if possible, otherwise PDF graphics .

# Chapter 10

## Other symbols

The following are all the symbols that didn't fit neatly or unambiguously into any of the previous chapters. (Do weather symbols belong under "Science and technology"? Should tally markers be considered "mathematics"?) While some of the tables contain clearly related groups of symbols (e.g., symbols related to cooking), others represent motley assortments of whatever the font designer felt like drawing.

TABLE 545: `textcomp` Genealogical Symbols

★	<code>\textborn</code>	○○	<code>\textdivorced</code>	⊗	<code>\textmarried</code>
†	<code>\textdied</code>	Ѡ	<code>\textleaf</code>		

TABLE 546: `wasysym` General Symbols

☒	<code>\ataribox</code>	∅	<code>\diameter</code>	⚡	<code>\lightning</code>	☼	<code>\sun</code>
▲	<code>\bell</code>	▼	<code>\DOWNarrow</code>	☎	<code>\phone</code>	▲	<code>\UParrow</code>
☺	<code>\blacksmiley</code>	☺	<code>\frownie</code>	◊	<code>\pointer</code>	⌘	<code>\wasycmd*</code>
▣	<code>\Bowtie</code>	❖	<code>\invdiameter</code>	○	<code>\recorder</code>	▢	<code>\wasylozenge</code>
⋮	<code>\brokenvert</code>	✖	<code>\kreuz</code>	▶	<code>\RIGHTarrow</code>		
✓	<code>\checked</code>	◀	<code>\LEFTarrow</code>	○○	<code>\rightturn</code>		
⌚	<code>\clock</code>	○○	<code>\leftturn</code>	☺	<code>\smiley</code>		

\* `wasysym` defines `\applecmd` as a synonym for `\wasycmd`.

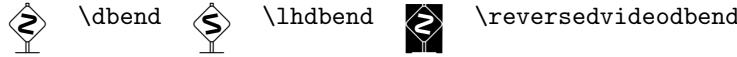
TABLE 547: *utfsym* Transportation Symbols

♣	\usym{1F3CD}	🚗	\usym{1F698}	ଓ	\usym{1F6B2}	🚌	\usym{1F6CC}
▬	\usym{1F3CE}	🚘	\usym{1F699}	ଓ	\usym{1F6B3}	🚍	\usym{1F6CD}
🛸	\usym{1F680}	🚐	\usym{1F69A}	ଓ	\usym{1F6B4}	🚖	\usym{1F6CE}
🚂	\usym{1F681}	🚐	\usym{1F69B}	ଓ	\usym{1F6B5}	🚖	\usym{1F6CF}
🚂	\usym{1F682}	🚐	\usym{1F69C}	🚶	\usym{1F6B6}	🚖	\usym{1F6D0}
🚂	\usym{1F683}	🚐	\usym{1F69D}	🚶	\usym{1F6B7}	●	\usym{1F6D1}
🚐	\usym{1F684}	🚐	\usym{1F69E}	🚶	\usym{1F6B8}	⚐	\usym{1F6D2}
🚐	\usym{1F685}	🚐	\usym{1F69F}	↑	\usym{1F6B9}	✖	\usym{1F6E0}
🚐	\usym{1F686}	🚐	\usym{1F6A0}	↑	\usym{1F6BA}	○	\usym{1F6E1}
⦿	\usym{1F687}	🚐	\usym{1F6A1}	↑↑	\usym{1F6BB}	■	\usym{1F6E2}
⦿	\usym{1F688}	🚐	\usym{1F6A2}	✳	\usym{1F6BC}	▣	\usym{1F6E3}
⛴	\usym{1F689}	⛴	\usym{1F6A3}	👉	\usym{1F6BD}	🚢	\usym{1F6E4}
⛴	\usym{1F68A}	⛴	\usym{1F6A4}	👉	\usym{1F6BE}	🚢	\usym{1F6E5}
🛳	\usym{1F68B}	🛳	\usym{1F6A5}	↑	\usym{1F6BF}	▲	\usym{1F6E6}
🛳	\usym{1F68C}	🛳	\usym{1F6A6}	↗	\usym{1F6C0}	✈	\usym{1F6E7}
🛳	\usym{1F68D}	🛳	\usym{1F6A7}	↗	\usym{1F6C1}	✈	\usym{1F6E8}
🛳	\usym{1F68E}	🛳	\usym{1F6A8}	↗	\usym{1F6C2}	🛫	\usym{1F6E9}
⛴	\usym{1F68F}	⛴	\usym{1F6A9}	↗	\usym{1F6C3}	🛬	\usym{1F6EA}
⛴	\usym{1F690}	⛴	\usym{1F6AA}	↗	\usym{1F6C4}	➡	\usym{1F6EB}
⛴	\usym{1F691}	⛴	\usym{1F6AB}	↗	\usym{1F6C5}	➡	\usym{1F6EC}
⛴	\usym{1F692}	⛴	\usym{1F6AC}	△	\usym{1F6C6}	➡	\usym{1F6F1}
⛴	\usym{1F693}	⛴	\usym{1F6AD}	ଓ	\usym{1F6C7}	➡	\usym{1F6F2}
⛴	\usym{1F694}	⛴	\usym{1F6AE}	ଓ	\usym{1F6C8}	➡	\usym{1F6F3}
⛴	\usym{1F695}	⛴	\usym{1F6AF}	↑	\usym{1F6C9}	➡	\usym{1F6F4}
⛴	\usym{1F696}	⛴	\usym{1F6B0}	↑	\usym{1F6CA}	➡	\usym{1F6F5}
🚗	\usym{1F697}	🚗	\usym{1F6B1}	↗	\usym{1F6CB}	➡	\usym{1F6F6}

All *utfsym* symbols are implemented with TikZ graphics, not with a font. In addition to `\usym`, the *utfsym* package defines `\usymH`, which renders a symbol at a given height, and `\usymW`, which renders a symbol at a given width. For example, “`\usymH{1F6F3}{36pt}`” produces



See the *utfsym* documentation for more information.

TABLE 548: *manfnt* Dangerous Bend Symbols

Note that these symbols descend far beneath the baseline. *manfnt* also defines non-descending versions, which it calls, correspondingly, `\textdbend`, `\textlhbend`, and `\textreversedvideobend`.

TABLE 549: Miscellaneous *manfnt* Symbols

○	\manboldkidney	○	\manpenkidney
◎	\manconcentriccircles	◎	\manquadrifolium
❖	\manconcentricdiamond	↷	\manquartercircle
◇	\mancone	↶	\manrotatedquadrifolium
□	\mancube	↶	\manrotatedquartercircle
↖→	\manerrarrow	☆	\manstar
■	\manfilledquartercircle	◀	\mantiltPennib
—	\manhpennib	▼	\mantriangledown
▣	\animpossiblecube	▶	\mantriangleright
○	\mankidney	▲	\mantriangleup
○	\manlhpenkidney	▶	\manvpennib

TABLE 550: *marvosym* Media Control Symbols

▶	\Forward	▼	\MoveDown	◀◀	\RewindToIndex	▀	\ToTop
▶	\ForwardToEnd	▲	\MoveUp	◀	\RewindToStart		
▶▶	\ForwardToIndex	◀	\Rewind	▼	\ToBottom		

TABLE 551: *typicons* Media Control Symbols

✖	\tiEject	▶	\tiMediaPlay	■	\tiMediaStop
✖	\tiEjectOutline	▷	\tiMediaPlayOutline	□	\tiMediaStopOutline
⏏	\tiMediaEject	◀	\tiMediaPlayReverse	⌚	\tiPower
⏏	\tiMediaEjectOutline	◁	\tiMediaPlayReverseOutline	⌚	\tiPowerOutline
▶▶	\tiMediaFastForward	●	\tiMediaRecord	🔉	\tiVolume
▶▶	\tiMediaFastForwardOutline	○	\tiMediaRecordOutline	🔉	\tiVolumeDown
⏸	\tiMediaPause	◀◀	\tiMediaRewind	🔇	\tiVolumeMute
⏸	\tiMediaPauseOutline	◀◀	\tiMediaRewindOutline	🔉	\tiVolumeUp

*typicons* requires either *Lua<sup>T</sup>E<sub>X</sub>* or *X<sub>H</sub><sup>T</sup>E<sub>X</sub>*.

TABLE 552: fontawesome5 Media Control Symbols

◀	\faBackward	▶	\faPlayCircle	▢	\faStopCircle[regular]
▲	\faEject	◎	\faPlayCircle[regular]	🔉	\faVolumeDown
◀◀	\faFastBackward	◀	\faStepBackward	🔇	\faVolumeMute
▶▶	\faFastForward	▶	\faStepForward	🔈	\faVolumeOff
▶▶	\faForward	■	\faStop	🔊	\faVolumeUp
▶	\faPlay	○	\faStopCircle		

TABLE 553: utfsym Media Control Symbols

☒	\usym{1F500}	♫	\usym{1F504}	◀	\usym{1F508}	▶	\usym{1F569}
⌚	\usym{1F501}	⌚	\usym{1F505}	◀	\usym{1F509}	⌚	\usym{1F56A}
⌚	\usym{1F502}	⌚	\usym{1F506}	◀	\usym{1F50A}		
⌚	\usym{1F503}	⌚	\usym{1F507}	▶	\usym{1F568}		

All `utfsym` symbols are implemented with TikZ graphics, not with a font. In addition to `\usym`, the `utfsym` package defines `\usymH`, which renders a symbol at a given height, and `\usymW`, which renders a symbol at a given width. See the `utfsym` documentation for more information.

TABLE 554: typicons Left/Right Pointers

◀	\tiChevronLeft	▶	\tiChevronRight
◀	\tiChevronLeftOutline	▶	\tiChevronRightOutline

`typicons` requires either `LuaATEX` or `XHATEX`.

TABLE 555: fontawesome5 Up/Down/Left/Right Pointers

❖	\faAngleDoubleDown	▶	\faCaretRight	❖	\faChevronCircleDown
««	\faAngleDoubleLeft	▣	\faCaretSquareDown	◀	\faChevronCircleLeft
»»	\faAngleDoubleRight	▣	\faCaretSquareDown[regular]	▶	\faChevronCircleRight
❖	\faAngleDoubleUp	◀	\faCaretSquareLeft	❖	\faChevronCircleUp
▼	\faAngleDown	◀	\faCaretSquareLeft[regular]	▼	\faChevronDown
◀	\faAngleLeft	▣	\faCaretSquareRight	◀	\faChevronLeft
▶	\faAngleRight	▣	\faCaretSquareRight[regular]	▶	\faChevronRight
^	\faAngleUp	▣	\faCaretSquareUp	^	\faChevronUp
▼	\faCaretDown	▣	\faCaretSquareUp[regular]		
◀	\faCaretLeft	▲	\faCaretUp		

TABLE 556: marvosym Laundry Symbols

	\AtForty		\Handwash		\ShortNinetyFive
	\AtNinetyFive		\IroningI		\ShortSixty
	\AtSixty		\IroningII		\ShortThirty
	\Bleech		\IroningIII		\SpecialForty
	\CleaningA		\NoBleech		\Tumbler
	\CleaningF		\NoChemicalCleaning		\WashCotton
	\CleaningFF		\NoIroning		\WashSynthetics
	\CleaningP		\NoTumbler		\WashWool
	\CleaningPP		\ShortFifty		
	\Dontwash		\ShortForty		

TABLE 557: Miscellaneous marvosym Symbols

	\Ankh		\CircledA		\Industry		\PointingHand
	\Bat		\ClockLogo		\Info		\Smiley
	\Bicycle		\Coffeecup		\Ladiesroom		\Wheelchair
	\BOLogo		\Cross		\ManFace		\WomanFace
	\BOLogoL		\Football		\MineSign		\WritingHand
	\BOLogoP		\Frowny		\Mundus		\Yinyang
	\Bouquet		\Gentsroom		@\MVAT		
	\Celtcross		\Heart		\PeaceDove		

TABLE 558: Miscellaneous universa Symbols

\bauforms    \bauhead

TABLE 559: Miscellaneous fourier Symbols

	\bomb		\noway		\textxswdown*		\warning
	\grimace		\textthing*		\textxswup*		

\* fourier defines math-mode synonyms for a few of the preceding symbols:  
 \thething (“\textthing”), \xswsup (“\textxswup”), and \xswdown (“\textxswdown”).

TABLE 560: `utfsym` Weather Symbols

!	\usym{1F321}	!	\usym{1F324}	!	\usym{1F327}	!	\usym{1F32A}
!	\usym{1F322}	!	\usym{1F325}	!	\usym{1F328}	!	\usym{1F32B}
!	\usym{1F323}	!	\usym{1F326}	!	\usym{1F329}	!	\usym{1F32C}

All `utfsym` symbols are implemented with TikZ graphics, not with a font. In addition to `\usym`, the `utfsym` package defines `\usymH`, which renders a symbol at a given height, and `\usymW`, which renders a symbol at a given width. See the `utfsym` documentation for more information.

TABLE 561: `twemoji` Weather Symbols

☁	\twemoji{cloud}	☀	\twemoji{sun behind cloud}
⚡	\twemoji{cloud with lightning}	⛅	\twemoji{sun behind large cloud}
⛈	\twemoji{cloud with lightning and rain}	🌧	\twemoji{sun behind rain cloud}
🌦	\twemoji{cloud with rain}	🌤	\twemoji{sun behind small cloud}
🌨	\twemoji{cloud with snow}	🌡	\twemoji{thermometer}
🌫	\twemoji{fog}	🌪	\twemoji{tornado}
☀	\twemoji{sun}	⾵	\twemoji{wind face}

Most `twemoji` symbols have multiple names. Only the most descriptive name for each symbol is shown in this table.

All `twemoji` symbols are implemented as PDF graphics, not with a font. See also the `hwemoji` package, which enables direct Unicode entry of emoji characters in `pdflATEX`; the `emoji` package, which provides a `LuaLATEX` interface to different underlying emoji fonts; and the `emo` package, which uses a font if possible, otherwise PDF graphics .

TABLE 562: `ifsym` Weather Symbols

☁	\Cloud	☃	\Hail	⛄	\Sleet	🌧	\WeakRain
☁	\FilledCloud	☀	\HalfSun	❄	\Snow	☁	\WeakRainCloud
☁	\FilledRainCloud	⚡	\Lightning	☃	\SnowCloud	☃	\FilledSnowCloud
☀	\FilledSunCloud	●	\NoSun	☀	\Sun		
🌧	\FilledWeakRainCloud	🌧	\Rain	☀	\SunCloud		
🌫	\Fog	☃	\RainCloud	🌫	\ThinFog		

In addition, `\Thermo{0}... \Thermo{6}` produce thermometers that are between 0/6 and 6/6 full of mercury: ☀☀☀☀☀☀☀

Similarly, `\wind{<sun>}{{<angle>}}{<strength>}` will draw wind symbols with a given amount of sun (0–4), a given angle (in degrees), and a given strength in km/h (0–100). For example, `\wind{0}{0}{0}` produces ☺, `\wind{2}{0}{0}` produces ☻, `\wind{4}{0}{0}` produces ☻, and `\wind{4}{0}{100}` produces ☻.

TABLE 563: typicons Weather Symbols

	\tiThermometer		\tiWeatherPartlySunny		\tiWeatherSunny
	\tiWeatherCloudy		\tiWeatherShower		\tiWeatherWindy
	\tiWeatherDownpour		\tiWeatherSnow		\tiWeatherWindyCloudy
	\tiWeatherNight		\tiWeatherStormy		

typicons requires either `LuaATEX` or `XJATEX`.

TABLE 564: fontawesome5 Weather Symbols

	\faCloud		\faIcicles		\faThermometerEmpty
	\faCloudMeatball		\faSmog		\faThermometerFull
	\faCloudMoon		\faSnowflake		\faThermometerHalf
	\faCloudMoonRain		\faSnowflake[regular]		\faThermometerQuarter
	\faCloudRain		\faSun		\faThermometerThreeQuarters
	\faCloudShowersHeavy		\faSun[regular]		\faWind
	\faCloudSun		\faTemperatureHigh		
	\faCloudSunRain		\faTemperatureLow		

TABLE 565: figchild Weather Symbols

	\fcCloud		\fcCloudC		\fcSunB
	\fcCloudA		\fcSun		\fcThermometerA
	\fcCloudB		\fcSunA		\fcThermometerB

All `figchild` symbols are implemented with `TikZ` graphics, not with a font. Not shown above, each symbol takes three arguments: a scale factor, a line color, and a line thickness. See the `figchild` documentation for more information.

TABLE 566: ifsym Alpine Symbols

	\SummitSign		\Summit		\SurveySign		\HalfFilledHut
	\StoneMan		\Mountain		\Joch		\VarSummit
	\Hut		\IceMountain		\Flag		
	\FilledHut		\VarMountain		\VarFlag		
	\Village		\VarIceMountain		\Tent		

TABLE 567: ifsym Clocks

 \Interval	 \StopWatchStart	 \VarClock	 \Wecker
 \StopWatchEnd	 \Taschenuhr	 \VarTaschenuhr	

ifsym also exports a \showclock macro. \showclock{\langle hours\rangle}{\langle minutes\rangle} outputs a clock displaying the corresponding time. For instance, “\showclock{5}{40}” produces “”. *\langle hours\rangle* must be an integer from 0 to 11, and *\langle minutes\rangle* must be an integer multiple of 5 from 0 to 55.

TABLE 568: utfsym Clocks

 \usym{1F550}	 \usym{1F557}	 \usym{1F55E}	 \usym{1F565}
 \usym{1F551}	 \usym{1F558}	 \usym{1F55F}	 \usym{1F566}
 \usym{1F552}	 \usym{1F559}	 \usym{1F560}	 \usym{1F567}
 \usym{1F553}	 \usym{1F55A}	 \usym{1F561}	 \usym{1F570}
 \usym{1F554}	 \usym{1F55B}	 \usym{1F562}	
 \usym{1F555}	 \usym{1F55C}	 \usym{1F563}	
 \usym{1F556}	 \usym{1F55D}	 \usym{1F564}	

All utfsym symbols are implemented with TikZ graphics, not with a font. In addition to \usym, the utfsym package defines \usymH, which renders a symbol at a given height, and \usymW, which renders a symbol at a given width. See the utfsym documentation for more information.

TABLE 569: clock Clocks

\ClockStyle	\ClockFramefalse	\ClockFrametrue
0		
1		
2		
3		

The clock package provides a \clock command to typeset an arbitrary time on an analog clock (and \clocktime to typeset the document’s build time). For example, the clocks in the above table were produced with \clock{15}{41}. Clock symbols are composed from a font of clock-face fragments using one of four values for \ClockStyle and either \ClockFrametrue or \ClockFramefalse as illustrated above. See the clock documentation for more information.

TABLE 570: twemojis Clocks

⌚	\twemoji{one o'clock}	⌚	\twemoji{eight-thirty}
⌚	\twemoji{one-thirty}	⌚	\twemoji{nine o'clock}
⌚	\twemoji{two o'clock}	⌚	\twemoji{nine-thirty}
⌚	\twemoji{two-thirty}	⌚	\twemoji{ten o'clock}
⌚	\twemoji{three o'clock}	⌚	\twemoji{ten-thirty}
⌚	\twemoji{three-thirty}	⌚	\twemoji{eleven o'clock}
⌚	\twemoji{four o'clock}	⌚	\twemoji{eleven-thirty}
⌚	\twemoji{four-thirty}	⌚	\twemoji{twelve o'clock}
⌚	\twemoji{five o'clock}	⌚	\twemoji{twelve-thirty}
⌚	\twemoji{five-thirty}	⌚	\twemoji{alarm clock}
⌚	\twemoji{six o'clock}	⌚	\twemoji{hourglass done}
⌚	\twemoji{six-thirty}	⌚	\twemoji{hourglass not done}
⌚	\twemoji{seven o'clock}	⌚	\twemoji{mantelpiece clock}
⌚	\twemoji{seven-thirty}	⌚	\twemoji{stopwatch}
⌚	\twemoji{eight o'clock}	⌚	\twemoji{timer clock}

Most twemojis symbols have multiple names. Only the most descriptive name for each symbol is shown in this table.

All twemojis symbols are implemented as PDF graphics, not with a font. See also the `hwemoji` package, which enables direct Unicode entry of emoji characters in pdfL<sup>A</sup>T<sub>E</sub>X; the `emoji` package, which provides a LuaL<sup>A</sup>T<sub>E</sub>X interface to different underlying emoji fonts; and the `emo` package, which uses a font if possible, otherwise PDF graphics .

TABLE 571: typicons Time and Date Symbols

📅	\tiCalendar	⌚	\tiStopwatch	⌚	\tiWatch
📅	\tiCalendarOutline	⌚	\tiTime	⌚	

typicons requires either LuaL<sup>A</sup>T<sub>E</sub>X or X<sub>L</sub>L<sup>A</sup>T<sub>E</sub>X.

TABLE 572: fontawesome5 Time and Date Symbols

⌚	\faBusinessTime	⌚	\faCalendarMinus	⌚	\faClock[regular]
📅	\faCalendar*[regular]	📅	\faCalendarMinus[regular]	📅	\faDigitalTachograph
📅	\faCalendar*	📅	\faCalendarPlus	⌚	\faHourglass
📅	\faCalendar	📅	\faCalendarPlus[regular]	⌚	\faHourglass[regular]
📅	\faCalendar[regular]	📅	\faCalendarTimes	⌚	\faHourglassEnd
📅	\faCalendarCheck	📅	\faCalendarTimes[regular]	⌚	\faHourglassHalf
📅	\faCalendarCheck[regular]	⌚	\faCalendarWeek	⌚	\faHourglassStart
📅	\faCalendarDay	⌚	\faClock	⌚	\faTachometer*

TABLE 573: twemojis Animals

🐜	\twemoji{ant}
🐤	\twemoji{baby chick}
🦝	\twemoji{badger}
🦇	\twemoji{bat}
🐻	\twemoji{bear}
🦴	\twemoji{beaver}
🐛	\twemoji{beetle}
🐦	\twemoji{bird}
🐈	\twemoji{black cat}
🐡	\twemoji{blowfish}
🐗	\twemoji{boar}
🐛	\twemoji{bug}
🦋	\twemoji{butterfly}
🐱	\twemoji{cat face}
😺	\twemoji{cat2}
🐔	\twemoji{chicken}
🐿	\twemoji{chipmunk}
蜚	\twemoji{cockroach}
🐮	\twemoji{cow face}
🐄	\twemoji{cow2}
🦀	\twemoji{crab}
🦗	\twemoji{cricket}
🐊	\twemoji{crocodile}
🦌	\twemoji{deer}
🦖	\twemoji{dodo}
🐶	\twemoji{dog face}
🐕	\twemoji{dog2}
🐬	\twemoji{dolphin}
🐉	\twemoji{dragon}
🐲	\twemoji{dragon face}
🐪	\twemoji{dromedary camel}
🦆	\twemoji{duck}
🦅	\twemoji{eagle}
🐘	\twemoji{elephant}
🐟	\twemoji{fish}
🦩	\twemoji{flamingo}
蜚	\twemoji{fly}
🦊	\twemoji{fox}
🐸	\twemoji{frog}
🐤	\twemoji{front-facing baby chick}
🦒	\twemoji{giraffe}
🐐	\twemoji{goat}
🦍	\twemoji{gorilla}
🦠	\twemoji{microbe}
🐒	\twemoji{monkey}
🐵	\twemoji{monkey face}
蜚	\twemoji{mosquito}
🐭	\twemoji{mouse face}
🐁	\twemoji{mouse2}
🐙	\twemoji{octopus}
orangutan	\twemoji{orangutan}
🦦	\twemoji{otter}
🦉	\twemoji{owl}
🐂	\twemoji{ox}
牡蠣	\twemoji{oyster}
🐼	\twemoji{panda}
🦜	\twemoji{parrot}
🐾	\twemoji{paw prints}
🦚	\twemoji{peacock}
🐧	\twemoji{penguin}
🐷	\twemoji{pig face}
🐽	\twemoji{pig nose}
🐖	\twemoji{pig2}
🐻	\twemoji{polar bear}
🐩	\twemoji{poodle}
🐰	\twemoji{rabbit face}
🐇	\twemoji{rabbit2}
🦦	\twemoji{raccoon}
🐎	\twemoji{racehorse}
🐏	\twemoji{ram}
🐀	\twemoji{rat}
🦓	\twemoji{rhinoceros}
🐓	\twemoji{rooster}
🦕	\twemoji{sauropod}
♏	\twemoji{scorpion}
🐋	\twemoji{seal}
🐕	\twemoji{service dog}
🦈	\twemoji{shark}
🐑	\twemoji{sheep}
🦐	\twemoji{shrimp}
🦡	\twemoji{skunk}
🦽	\twemoji{sloth}
🐌	\twemoji{snail}
🐍	\twemoji{snake}
🐚	\twemoji{spiral shell}
🐳	\twemoji{spouting whale}

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	\twemoji{guide dog}		\twemoji{squid}
	\twemoji{hamster}		\twemoji{swan}
	\twemoji{hatching chick}		\twemoji{T-Rex}
	\twemoji{hedgehog}		\twemoji{tiger face}
	\twemoji{hippopotamus}		\twemoji{tiger2}
	\twemoji{honeybee}		\twemoji{tropical fish}
	\twemoji{horse face}		\twemoji{turkey}
	\twemoji{kangaroo}		\twemoji{turtle}
	\twemoji{koala}		\twemoji{two-hump camel}
	\twemoji{lady beetle}		\twemoji{unicorn}
	\twemoji{leopard}		\twemoji{water buffalo}
	\twemoji{lion}		\twemoji{whale2}
	\twemoji{lizard}		\twemoji{wolf}
	\twemoji{llama}		\twemoji{worm}
	\twemoji{lobster}		\twemoji{zebra}
	\twemoji{mammoth}		

Most twemojis symbols have multiple names. Only the most descriptive name for each symbol is shown in this table.

All twemojis symbols are implemented as PDF graphics, not with a font. See also the `hwemoji` package, which enables direct Unicode entry of emoji characters in pdfLATEX; the `emoji` package, which provides a LuaLATEX interface to different underlying emoji fonts; and the `emo` package, which uses a font if possible, otherwise PDF graphics .

TABLE 574: fontawesome5 Animals

	\faBug		\faDove		\faHippo		\faOtter
	\faCat		\faDragon		\faHorse		\faSpider
	\faCrow		\faFish		\faHorseHead		
	\faDog		\faFrog		\faKiwiBird		

TABLE 575: figchild Animals

	\fcAlligator		\fcGiraffeA
	\fcAlligatorA		\fcGiraffeB
	\fcAnt		\fcGraffes
	\fcAntA		\fcGnat
	\fcAntelope		\fcGoose
	\fcArmadillo		\fcHerring
	\fcBat		\fcHippo
	\fcBear		\fcHorse
	\fcBearA		\fcHorseA
	\fcBearB		\fcHummingbird
	\fcBearC		\fcKittenA
	\fcBearD		\fcKittenB
	\fcBears		\fcKittensA
	\fcBee		\fcKittensB
	\fcBeeA		\fcLadybirdA
	\fcBird		\fcLadybirdB
	\fcBirdA		\fcLadyBug
	\fcBirdB		\fcLamb
	\fcBirdC		\fcLion
	\fcBirdD		\fcLionA
	\fcBirdE		\fcLittleBirds
	\fcBull		\fcLittleMouse

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	\fcBunnyA		\fcLocust
	\fcBunnyB		\fcLouvadeus
	\fcBunnyC		\fcMacaw
	\fcBunnyD		\fcMonkey
	\fcBunnyE		\fcMonkeyA
	\fcButterfly		\fcMoonfish
	\fcButterflyA		\fcMoose
	\fcButterflyB		\fcMouse
	\fcButterflyC		\fcMouseA
	\fcCalf		\fcMouseB
	\fcCat		\fcOctopus
	\fcCaterpillar		\fcOctopusA
	\fcCatfish		\fcOrca
	\fcCentipede		\fcOstrich
	\fcChick		\fcOwl
	\fcChicken		\fcOwlA
	\fcChicks		\fcOwlB
	\fcCobrabebe		\fcOx
	\fcCow		\fcPandaBear
	\fcCrabA		\fcParrot
	\fcCrabB		\fcPeacock
	\fcDinosaurA		\fcPenguin
	\fcDinosaurB		\fcPerch

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	\fcDinosaurC		\fcPeruA
	\fcDinosaurD		\fcPeruB
	\fcDinosaurE		\fcPig
	\fcDinosaurF		\fcPigA
	\fcDinosaurG		\fcPigB
	\fcDinosaurH		\fcPigC
	\fcDinosaurI		\fcPigD
	\fcDinosaurJ		\fcPigE
	\fcDog		\fcPuppy
	\fcDolphin		\fcRabbit
	\fcDolphinA		\fcRabbitA
	\fcDragonFly		\fcRabbits
	\fcDuck		\fcRaccoon
	\fcDuckA		\fcScorpion
	\fcDuckB		\fcSeahorse
	\fcDuckC		\fcShark
	\fcElephant		\fcSheep
	\fcElephantA		\fcSheepA
	\fcElephantB		\fcSheepB
	\fcFishA		\fcSheepC
	\fcFishB		\fcSnailA
	\fcFishC		\fcSnailB
	\fcFishD		\fcSnailC

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	\fcFishE		\fcSpider
	\fcFishF		\fcSpiderA
	\fcFishG		\fcSpiderB
	\fcFishH		\fcSquirrel
	\fcFishI		\fcSquirrelA
	\fcFishK		\fcSturgeon
	\fcFishL		\fcToucan
	\fcFishM		\fcTurtle
	\fcFlamingo		\fcTurtleA
	\fcFlamingoA		\fcTurtleB
	\fcFrog		\fcUrchin
	\fcGiraffe		\fcZebra

All `figchild` symbols are implemented with `TikZ` graphics, not with a font. Not shown above, each symbol takes three arguments: a scale factor, a line color, and a line thickness. See the `figchild` documentation for more information.

TABLE 576: `utfsym` Animals

❖	<code>\usym{1F400}</code>	❖	<code>\usym{1F410}</code>	❖	<code>\usym{1F420}</code>	❖	<code>\usym{1F430}</code>
❖	<code>\usym{1F401}</code>	❖	<code>\usym{1F411}</code>	❖	<code>\usym{1F421}</code>	❖	<code>\usym{1F431}</code>
❖	<code>\usym{1F402}</code>	❖	<code>\usym{1F412}</code>	❖	<code>\usym{1F422}</code>	❖	<code>\usym{1F432}</code>
❖	<code>\usym{1F403}</code>	❖	<code>\usym{1F413}</code>	❖	<code>\usym{1F423}</code>	❖	<code>\usym{1F433}</code>
❖	<code>\usym{1F404}</code>	❖	<code>\usym{1F414}</code>	❖	<code>\usym{1F424}</code>	❖	<code>\usym{1F434}</code>
❖	<code>\usym{1F405}</code>	❖	<code>\usym{1F415}</code>	❖	<code>\usym{1F425}</code>	❖	<code>\usym{1F435}</code>
❖	<code>\usym{1F406}</code>	❖	<code>\usym{1F416}</code>	❖	<code>\usym{1F426}</code>	❖	<code>\usym{1F436}</code>
❖	<code>\usym{1F407}</code>	❖	<code>\usym{1F417}</code>	❖	<code>\usym{1F427}</code>	❖	<code>\usym{1F437}</code>
❖	<code>\usym{1F408}</code>	❖	<code>\usym{1F418}</code>	❖	<code>\usym{1F428}</code>	❖	<code>\usym{1F438}</code>
❖	<code>\usym{1F409}</code>	❖	<code>\usym{1F419}</code>	❖	<code>\usym{1F429}</code>	❖	<code>\usym{1F439}</code>
❖	<code>\usym{1F40A}</code>	❖	<code>\usym{1F41A}</code>	❖	<code>\usym{1F42A}</code>	❖	<code>\usym{1F43A}</code>
❖	<code>\usym{1F40B}</code>	❖	<code>\usym{1F41B}</code>	❖	<code>\usym{1F42B}</code>	❖	<code>\usym{1F43B}</code>
❖	<code>\usym{1F40C}</code>	❖	<code>\usym{1F41C}</code>	❖	<code>\usym{1F42C}</code>	❖	<code>\usym{1F43C}</code>
❖	<code>\usym{1F40D}</code>	❖	<code>\usym{1F41D}</code>	❖	<code>\usym{1F42D}</code>	❖	<code>\usym{1F43D}</code>
❖	<code>\usym{1F40E}</code>	❖	<code>\usym{1F41E}</code>	❖	<code>\usym{1F42E}</code>	❖	<code>\usym{1F43E}</code>
❖	<code>\usym{1F40F}</code>	❖	<code>\usym{1F41F}</code>	❖	<code>\usym{1F42F}</code>	❖	<code>\usym{1F43F}</code>

All `utfsym` symbols are implemented with TikZ graphics, not with a font. In addition to `\usym`, the `utfsym` package defines `\usymH`, which renders a symbol at a given height, and `\usymW`, which renders a symbol at a given width. For example, “`\usymH{1F409}{36pt}`” produces



See the `utfsym` documentation for more information.

TABLE 577: `hhcount` Tally Markers

	<code>\fcscore{1}</code>		<code>\fcscore{3}</code>	#	<code>\fcscore{5}</code>
	<code>\fcscore{2}</code>		<code>\fcscore{4}</code>		

The `\fcscore` command accepts values larger than 5. For example, “`\fcscore{47}`” produces “||||||||||||||||||||||||||||||”.

TABLE 578: `ifsym` Tally Markers

	<code>\StrokeOne</code>		<code>\StrokeThree</code>	#	<code>\StrokeFive</code>
	<code>\StrokeTwo</code>		<code>\StrokeFour</code>		

TABLE 579: `\bullcntr` Tally Markers

•	<code>\bullcntr{&lt;1&gt;}</code>		<code>\bullcntr{&lt;4&gt;}</code>		<code>\bullcntr{&lt;7&gt;}</code>
• •	<code>\bullcntr{&lt;2&gt;}</code>		<code>\bullcntr{&lt;5&gt;}</code>		<code>\bullcntr{&lt;8&gt;}</code>
• • •	<code>\bullcntr{&lt;3&gt;}</code>		<code>\bullcntr{&lt;6&gt;}</code>		<code>\bullcntr{&lt;9&gt;}</code>

The notation for `\bullcntr` used in the above bears explanation. `\bullcntr` does not take a number as its argument but rather a L<sup>A</sup>T<sub>E</sub>X counter, whose value it uses to typeset a tally marker. “`\bullcntr{<3>}`”, for example, means to invoke `\bullcntr` with a counter whose value is 3. (`\bullcntr` usage is therefore akin to that of L<sup>A</sup>T<sub>E</sub>X’s `\fnsymbol`.) The intention is to use `\bullcntr` indirectly via the `bullenum` package’s `bullenum` environment, which is a variation on the `enumerate` environment that uses `\bullcntr` to typeset the labels.

To typeset individual tally markers, one can define a helper command:

```
\newcounter{bull}
\newcommand{\showbullcntr}[1]{%
  \setcounter{bull}{#1}%
  \bullcntr{bull}%
}
```

`bullcntr`’s package options `smallctrbull`, `largectrbull`, and `heartctrbull` and corresponding commands `\smallctrbull`, `\largectrbull`, and `\heartctrbull` control the formatting of each tally marker:

<code>small</code>	<code>large</code>	<code>heart</code>
<code>\bullcntr{&lt;5&gt;}</code>		

The default is `smartctrbull` (`\smartctrbull`), which maps counter values 1–5 to large pips and 6–9 to small pips. It is also possible to use arbitrary symbols for `\bullcntr`’s pips. See the `bullcntr` documentation for more information.

TABLE 580: dozenal Tally Markers

	<code>\tally{1}</code>	□	<code>\tally{3}</code>	□	<code>\tally{5}</code>
└	<code>\tally{2}</code>	□	<code>\tally{4}</code>	□	<code>\tally{6}</code>

TABLE 581: *figchild* Letters and Digits

	\fcLetterK		\fcLetterT	3	\fcNumberThree
	\fcLetterL		\fcLetterU	4	\fcNumberFour
	\fcLetterM		\fcLetterV	5	\fcNumberFive
	\fcLetterN		\fcLetterW	6	\fcNumberSix
	\fcLetterO		\fcLetterX	7	\fcNumberSeven
	\fcLetterP		\fcLetterY	8	\fcNumberEight
	\fcLetterQ		\fcLetterZ	9	\fcNumberNine
	\fcLetterR	1	\fcNumberOne	10	\fcNumberTen
	\fcLetterS	2	\fcNumberTwo		

It's a mystery why *figchild*'s alphabet begins with "K".

All *figchild* symbols are implemented with Ti<sub>Z</sub> graphics, not with a font. Not shown above, each symbol takes three arguments: a scale factor, a line color, and a line thickness. See the *figchild* documentation for more information.

TABLE 582: *skull* Symbols

\skull

TABLE 583: Non-Mathematical *mathabx* Symbols

† \rip

TABLE 584: Miscellaneous *ifsym* Symbols

❖	\FilledSectioningDiamond	✉	\Letter	☢	\Radiation
▲	\Fire	☞	\PaperLandscape	❖	\SectioningDiamond
✗	\Irritant	☞	\PaperPortrait	☎	\Telephone

TABLE 585: asapsym Signs

Ⓐ	\asapCigaretteSign	Ⓖ	\asapNotEmergencySign
Ⓑ	\asapDogSign	Ⓗ	\asapNotHelpSign
Ⓒ	\asapDollarSign	Ⓗ	\asapNotHospitalSign
Ⓔ	\asapEmergencySign	Ⓛ	\asapNotInformationSign
Ⓕ	\asapHelpSign	Ⓜ	\asapNotMobilePhoneSign
Ⓖ	\asapHospitalSign	Ⓡ	\asapNotParkingSign
Ⓗ	\asapInformationSign	Ⓛ	\asapNotSign
Ⓛ	\asapMobilePhoneSign	Ⓜ	\asapNotWalkSign
Ⓜ	\asapNotCigaretteSign	Ⓡ	\asapParkingSign
Ⓝ	\asapNotDogSign	Ⓛ	\asapWalkSign
Ⓣ	\asapNotDollarSign		

`asapsym` requires either `LuaLATEX` or `XFLATEX`.

TABLE 586: metre Metrical Symbols

$\times$	$\backslash a$	$\circ$	$\backslash bBm$	$=$	$\backslash cc$	$\diamond$	$\backslash Mb{b}$	$\cdots$	$\backslash Ppp{p}$	$\otimes$	$\backslash t$
$\circlearrowleft$	$\backslash B$	$\circlearrowright$	$\backslash bb{m}$	$\equiv$	$\backslash Ccc$	$\bowtie$	$\backslash mb{bx}$	$\cdots$	$\backslash ppp{p}$	$\lceil$	$\backslash tsb{m}$
$\circlearrowuparrow$	$\backslash b$	$\circlearrowleft\circlearrowright$	$\backslash Bbm$	$-$	$\backslash m$	$\circ\circ$	$\backslash oo$	$\cdots$	$\backslash Ppp{ppp}$	$\rfloor$	$\backslash tsmb$
$\circlearrowleft\circlearrowright$	$\backslash Bb$	$\circlearrowleft\circlearrowright$	$\backslash bbmb$	$\backslash'$	$\backslash M$	$.$	$\backslash p$	$\cdots$	$\backslash ppp{ppp}$	$\rfloor\lceil$	$\backslash tsmm$
$\circlearrowright\circlearrowleft$	$\backslash BB$	$\circlearrowright\circlearrowleft$	$\backslash bbmx$	$\boxtimes$	$\backslash ma$	$\dashv$	$\backslash pm$	$\sqcup$	$\backslash ps$	$\pm$	$\backslash vpp{m}$
$\circlearrowleft\circlearrowright$	$\backslash bb$	$\circlearrowleft\circlearrowright$	$\backslash bm$	$\divideontimes$	$\backslash Mb$	$:$	$\backslash pp$	$:$	$\backslash pxp$	$\pm$	$\backslash vpp{pp}$
$\circlearrowleft\circlearrowright$	$\backslash bB$	$\circlearrowleft\circlearrowright$	$\backslash Bm$	$\triangleright$	$\backslash mb$	$:$	$\backslash Pp$	$:$	$\backslash Px{p}$	$::$	$\backslash x$
$\circlearrowleft\circlearrowright$	$\backslash bba$	$\circlearrowleft\circlearrowright$	$\backslash c$	$\divideontimes$	$\backslash mBb$	$\perp$	$\backslash ppm$	$\sim$	$\backslash R$		
$\circlearrowleft\circlearrowright$	$\backslash bbb$	$\circlearrowleft\circlearrowright$	$\backslash C$	$\divideontimes$	$\backslash mbB$	$\cdots$	$\backslash pp{p}$	$\sim$	$\backslash r$		
$\circlearrowleft\circlearrowright$	$\backslash BBm$	$\circlearrowleft\circlearrowright$	$\backslash Cc$	$\divideontimes$	$\backslash mbb$	$\cdots$	$\backslash Ppp{p}$	$\otimes$	$\backslash T$		

The preceding symbols are valid only within the argument to the \metre command.

TABLE 587: metre Small and Large Metrical Symbols

÷	\anaclasis	÷	\Anaclasis
<	\antidiple	<	\Antidiple
≀	\antidiple*	≀	\Antidiple*
▷	\antisigma	▷	\Antisigma
⌘	\asteriscus	⌘	\Asteriscus
^K	\catalexis	^K	\Catalexis
>	\diple	>	\Diple
⌘	\diple*	⌘	\Diple*
—	\obelus	—	\Obelus
÷	\obelus*	÷	\Obelus*
~	\respondens	~	\Respondens
⊗	\terminus	⊗	\Terminus
⊕	\terminus*	⊕	\Terminus*

TABLE 588: teubner Metrical Symbols

oo	\aeolicbii	o	\barbrevis	+	\ipercatal
ooo	\aeolicbiii	oo	\bbrevis	-	\longa
oooo	\aeolicbiv	o	\brevis	~	\ubarbbrevis
x	\anceps	^	\catal	~	\ubarbrevis
~x	\ancepsdbrevis	~o	\corona	~~	\ubarsbrevis
~x	\banceps	~o	\coronainv	o	\ubrevislonga
oo	\barbbrevis	H	\hiatus		

The `teubner` package provides a `\newmetrics` command that helps users combine the preceding symbols as well as other `teubner` symbols. For example, the predefined `\pentam` symbol uses `\newmetrics` to juxtapose six `\longas`, two `\barbbrevises`, four `\brevises`, and a `\dBar` into “`_oo_oo_|_oo_oo_`”. See the `teubner` documentation for more information.

TABLE 589: hamnosys Hand Shapes

o	\hamceeeall	o	\hamfingertwothree	o	\hamflathand
o	\hamceeeonetwo	o	\hamfingertwothreefourfive	o	\hampinchall
o	\hamceeeopen	o	\hamfingertwothreespread	o	\hampinchonetwo
o	\hamfingertwo	o	\hamfist	o	\hampinchonetwoopen

`hamnosys` requires either `LuaATEX` or `XQATEX`.

TABLE 590: hamnosys Hand-Shape Modifiers

^	\hamdoublebent	^-	\hamfingerhookmod	,	\hamthumbopenmod
~	\hamdoublehooked	~-	\hamfingerstraightmod	~	\hamthumboutmod
~	\hamfingerbendmod	~	\hamthumbacrossmod		

`hamnosys` requires either `LuaATEX` or `XQATEX`.

TABLE 591: hamnosys Extended Finger Directions

^	\hamextfingerd	^	\hamextfingeril	>	\hamextfingerr
^	\hamextfingerdi	^	\hamextfingerir	~	\hamextfingeru
^	\hamextfingerdl	^	\hamextfingerl	~	\hamextfingerui
^	\hamextfingerdo	^	\hamextfingero	~	\hamextfingerul
^	\hamextfingerdr	^	\hamextfingerol	~	\hamextfingeruo
^	\hamextfingeri	^	\hamextfingeror	~	\hamextfingerur

`hamnosys` requires either `LuaATEX` or `XQATEX`.

TABLE 592: *hamnosys* Palm Orientations

-	\hampalmd	>	\hampalmdr	<	\hampalmr	>	\hampalmul
<	\hampalmdl	<	\hampalml	>	\hampalmu	<	\hampalmur

*hamnosys* requires either *LuaLaTeX* or *XeLaTeX*.

TABLE 593: *hamnosys* Body Locations

▀	\hambelowstomach	▀	\hamfingertip	▀	\hampinkyside
♪	\hamcheek	□	\hamforehead	▲	\hamringfinger
▀	\hamchest	~	\hamhandback	▀	\hamshoulders
○	\hamchin	○	\hamhead	▀	\hamshouldertop
?	\hamear	○	\hamheadtop	▀	\hamstomach
?	\hamearlobe	?	\hamindexfinger	◀	\hamteeth
└	\hamelbow	◦	\hamlips	↑	\hamthumb
└	\hamelbowinside	└	\hamlowerarm	↶	\hamthumbball
~	\hameybrows	?	\hammiddlefinger	↑	\hamthumbside
∞	\hameyes	』	\hamneck	◀	\hamtongue
▀	\hamfingerbase	∅	\hamneutralspace	↙	\hamunderchin
▀	\hamfingermidjoint	₧	\hamnose	↖	\hamupperarm
▀	\hamfingernail	₧	\hamnostrils	↗	\hamwristback
▀	\hamfingerpad	~	\hampalm	↘	\hamwristpulse
▀	\hamfingerside	5	\hampinky		

*hamnosys* requires either *LuaLaTeX* or *XeLaTeX*.

TABLE 594: *hamnosys* Location Modifiers

○	\hamcoreoref	□	\hamcoreftag	▪	\hamlrat	◦	\hamlrbeside
---	--------------	---	--------------	---	----------	---	--------------

*hamnosys* requires either *LuaLaTeX* or *XeLaTeX*.

TABLE 595: hamnosys Movements

^ \hamarcd	o \hamclockdl	< \hammoveil
^ \hamarcl	o \hamclockdr	> \hammoveir
^ \hamarcr	⊕ \hamclockfull	↑ \hammovel
^ \hamarcu	o \hamclockl	↑ \hammoveo
^ \hamarmextended	o \hamclockr	↖ \hammoveol
^ \hambehind	o \hamclocku	↗ \hammoveor
^ \hambrushing	o \hamclockul	→ \hammovever
^ \hamcircled	o \hamclockur	↑ \hammoveu
^ \hamcircledi	○ \hamclose	↖ \hammoveui
^ \hamcircledl	× \hamcross	↖ \hammoveul
^ \hamcircledo	> \hamdecreasing	↖ \hammoveuo
^ \hamcircledr	⊖ \hamellipseh	↑ \hammoveur
^ \hamcirclei	⊖ \hamellipseul	↖ \hamnoddng
^ \hamcircleil	⊖ \hamellipseur	↖ \hamnomotion
^ \hamcircleir	⊖ \hamellipsev	→ \hamreplace
^ \hamcirclel	* \hamfast	↑ \hamrest
^ \hamcircleo	✿ \hamfingerplay	— \hamslow
^ \hamcircleol	\hamhalt	? \hamstircw
^ \hamcircleor	< \hamincreasing	? \hamstircw
^ \hamcircler	◊ \haminterlock	↑ \hamswinging
^ \hamcircleu	↓ \hammoved	✗ \hamtense
^ \hamcircleui	↖ \hammovedi	✗ \hamtouch
^ \hamcircleul	↖ \hammovedl	ψ \hamtwisting
^ \hamcircleuo	↖ \hammovedo	~~ \hamwavy
^ \hamcircleur	↖ \hammovedr	~~ \hamzigzag
^ \hamclockd	± \hammovei	

hamnosys requires either  $\text{Lua}\text{\LaTeX}$  or  $\text{Xe}\text{\LaTeX}$ .

TABLE 596: hamnosys Movement Modifiers

. \hamlargemod . \hamsmallmod

hamnosys requires either  $\text{Lua}\text{\LaTeX}$  or  $\text{Xe}\text{\LaTeX}$ .

TABLE 597: hamnosys Obsolete Spacing Symbols

‡ \hammovecross	↑ \hamwristtoback	↗ \hamwristtopulse
✗ \hammoveX	↑ \hamwristtopinky	↑ \hamwristtothumb

hamnosys requires either  $\text{Lua}\text{\LaTeX}$  or  $\text{Xe}\text{\LaTeX}$ .

TABLE 598: Miscellaneous *hamnosys* Symbols

~	\hamalternatingmotion	,	\hamplus
\	\hambetween	†	\hamrepeatcontinue
..	\hametc	‡	\hamrepeatcontinueseveral
<	\hamfusionbegin	+	\hamrepeatfromstart
)	\hamfusionend	#	\hamrepeatfromstartseveral
□	\hammime	‡	\hamrepeatreverse
∅	\hamnondominant	(	\hamseqbegin
§	\hamnonipsi	)	\hamseqend
~	\hamorirelative	“	\hamsymmlr
[	\hamparbegin	:	\hamsympar
]	\hamparend		

*hamnosys* requires either  $\text{Lua}\text{\LaTeX}$  or  $\text{Xe}\text{\LaTeX}$ .

TABLE 599: *dictsym* Dictionary Symbols

☒	\dsaeeronautical	†	\dscommercial	☒	\dsmedical
☛	\dsagricultural	☒	\dsheraldical	☒	\dsmilitary
▲	\dsarchitectural	☒	\dsjuridical	☒	\dsrailways
☞	\dsbiological	☒	\dsliterary	☒	\dstechanical
⚗	\dschemical	☒	\dsmathematical		

TABLE 600: pmboxdraw Box-Drawing Symbols

	\textblock		\textSFli		\textSFxli		\textSFxxiii
	\textdkshade		\textSFlii		\textSFxlii		\textSFxxiv
	\textdnblock		\textSFliii		\textSFxliii		\textSFxxxv
	\textlfblock		\textSFliv		\textSFxliv		\textSFxxvi
	\textltshade		\textSFv		\textSFxlix		\textSFxxvii
	\textrtblock		\textSFvi		\textSFxlv		\textSFxxviii
	\textSFi		\textSFvii		\textSFxlvi		\textSFxxxix
	\textSFii		\textSFviii		\textSFxlvii		\textSFxxxvi
	\textSFiii		\textSFx		\textSFxlviii		\textSFxxxvii
	\textSFiv		\textSFxi		\textSFxx		\textSFxxxviii
	\textSFix		\textSFxix		\textSFxxi		\textshade
	\textSF1		\textSFxl		\textSFxxii		\textupblock

Code Page 437 (CP437), which was first utilized by the original IBM PC, contains the set of box-drawing symbols (sides, corners, and intersections of single- and double-ruled boxes) shown above in character positions 176–223. These symbols also appear in the Unicode Box Drawing and Block Element tables.

The `pmboxdraw` package draws the CP437 box-drawing symbols using TeX rules (specifically, `\vrule`) instead of with a font and thereby provides the ability to alter both rule width and the separation between rules. See the `pmboxdraw` documentation for more information.

TABLE 601: staves Magical Staves

	\staveI		\staveXXIV		\staveXLVII
	\staveII		\staveXXV		\staveXLVIII
	\staveIII		\staveXXVI		\staveXLIX
	\staveIV		\staveXXVII		\staveL
	\staveV		\staveXXVIII		\staveLI
	\staveVI		\staveXXIX		\staveLII
	\staveVII		\staveXXX		\staveLIII

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	\staveVIII		\staveXXXI		\staveLIV
	\staveIX		\staveXXXII		\staveLV
	\staveX		\staveXXXIII		\staveLVI
	\staveXI		\staveXXXIV		\staveLVII
	\staveXII		\staveXXXV		\staveLVIII
	\staveXIII		\staveXXXVI		\staveLIX
	\staveXIV		\staveXXXVII		\staveLX
	\staveXV		\staveXXXVIII		\staveLXI
	\staveXVI		\staveXXXIX		\staveLXII
	\staveXVII		\staveXL		\staveLXIII
	\staveXVIII		\staveXLI		\staveLXIV
	\staveXIX		\staveXLII		\staveLXV
	\staveXX		\staveXLIII		\staveLXVI
	\staveXXI		\staveXLIV		\staveLXVII
	\staveXXII		\staveXLV		\staveLXVIII
	\staveXXIII		\staveXLVI		

The meanings of these symbols are described on the Web site for the Museum of Icelandic Sorcery and Witchcraft at [http://www.galdrasynning.is/index.php?option=com\\_content&task=category&sectionid=5&id=18&Itemid=60](http://www.galdrasynning.is/index.php?option=com_content&task=category&sectionid=5&id=18&Itemid=60) (TinyURL: <http://tinyurl.com/25979m>). For example, \staveL (“ᛒ”“ᛖ”“ᛚ”) is intended to ward off ghosts and evil spirits.

TABLE 602: *pigpen* Cipher Symbols

⊣	{\pigpenfont A}	⊣	{\pigpenfont J}	∨	{\pigpenfont S}
⊴	{\pigpenfont B}	⊴	{\pigpenfont K}	>	{\pigpenfont T}
⊢	{\pigpenfont C}	⊢	{\pigpenfont L}	<	{\pigpenfont U}
⊤	{\pigpenfont D}	⊤	{\pigpenfont M}	∧	{\pigpenfont V}
⊥	{\pigpenfont E}	⊥	{\pigpenfont N}	∨	{\pigpenfont W}
⊤	{\pigpenfont F}	⊤	{\pigpenfont O}	>	{\pigpenfont X}
⊤	{\pigpenfont G}	⊤	{\pigpenfont P}	<	{\pigpenfont Y}
⊤	{\pigpenfont H}	⊤	{\pigpenfont Q}	∧	{\pigpenfont Z}
⊤	{\pigpenfont I}	⊤	{\pigpenfont R}		

TABLE 603: *Giga2e* Phases of the Moon

∅ \MoonPha{1} ♀ \MoonPha{2} ☽ \MoonPha{3} ♂ \MoonPha{4}

TABLE 604: *twemojis* Phases of the Moon

🌙 \twemoji{crescent moon}	🌑 \twemoji{new moon}
🌓 \twemoji{first quarter moon}	🌒 \twemoji{new moon face}
🌔 \twemoji{first quarter moon face}	🌖 \twemoji{waning crescent moon}
🌕 \twemoji{full moon}	🌗 \twemoji{waning gibbous moon}
🌖 \twemoji{full moon face}	🌘 \twemoji{waxing crescent moon}
🌗 \twemoji{last quarter moon}	🌙 \twemoji{waxing gibbous moon}
🌘 \twemoji{last quarter moon face}	

Most *twemojis* symbols have multiple names. Only the most descriptive name for each symbol is shown in this table.

All *twemojis* symbols are implemented as PDF graphics, not with a font. See also the *hwemoji* package, which enables direct Unicode entry of emoji characters in *pdfLATEX*; the *emoji* package, which provides a *LuaLATEX* interface to different underlying emoji fonts; and the *emo* package, which uses a font if possible, otherwise PDF graphics .

TABLE 605: `figchild` Space Symbols

	<code>\fcET</code>		<code>\fcPlanetF</code>		<code>\fcShootingStar</code>
	<code>\fcFlyingSaucer</code>		<code>\fcPlanetG</code>		<code>\fcSpacecraftA</code>
	<code>\fcMoonA</code>		<code>\fcPlanets</code>		<code>\fcSpacecraftB</code>
	<code>\fcMoonB</code>		<code>\fcRocket</code>		<code>\fcStar</code>
	<code>\fcPlanetA</code>		<code>\fcRocketA</code>		<code>\fcStarA</code>
	<code>\fcPlanetB</code>		<code>\fcRocketB</code>		<code>\fcStarB</code>
	<code>\fcPlanetC</code>		<code>\fcRocketC</code>		<code>\fcStars</code>
	<code>\fcPlanetD</code>		<code>\fcSaturnA</code>		
	<code>\fcPlanetE</code>		<code>\fcSaturnB</code>		

All `figchild` symbols are implemented with `TikZ` graphics, not with a font. Not shown above, each symbol takes three arguments: a scale factor, a line color, and a line thickness. See the `figchild` documentation for more information.

TABLE 606: `GHNA2e` Recycling Symbols

 `\Greenpoint`

TABLE 607: `marvosym` Recycling Symbols

 `\PackingWaste`     `\Recycling`

TABLE 608: `utfsym` Recycling Symbols

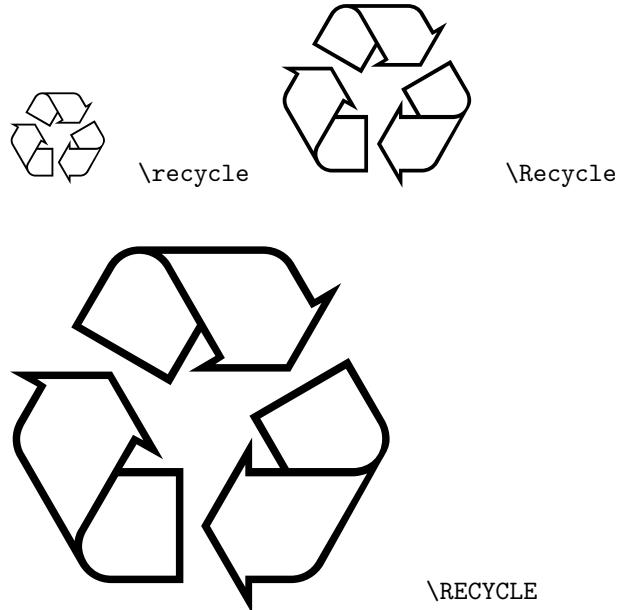
	<code>\usym{2672}</code>		<code>\usym{2676}</code>		<code>\usym{267A}</code>		<code>\usym{267E}</code>
	<code>\usym{2673}</code>		<code>\usym{2677}</code>		<code>\usym{267B}</code>		
	<code>\usym{2674}</code>		<code>\usym{2678}</code>		<code>\usym{267C}</code>		
	<code>\usym{2675}</code>		<code>\usym{2679}</code>		<code>\usym{267D}</code>		

All `utfsym` symbols are implemented with `TikZ` graphics, not with a font. In addition to `\usym`, the `utfsym` package defines `\usymH`, which renders a symbol at a given height, and `\usymW`, which renders a symbol at a given width. See the `utfsym` documentation for more information.

TABLE 609: fontawesome5 Recycling Symbols

 \faRecycle

TABLE 610: recycle Recycling Symbols



The METAFONT code that implements the recycling symbols shown above is, in the words of its author, “awful code [that] doesn’t even put the logo in a box (properly)”. Expect to receive “**Inconsistent equation (off by *number*)**” errors from METAFONT. Fortunately, if you tell METAFONT to proceed past those errors (e.g., by pressing Enter after each one or by specifying “**-interaction=nonstopmode**” on the METAFONT command line) it should produce a valid font.

The commands listed above should be used within a group (e.g., “`\{\recycle\}`”) because they exhibit the side effect of *changing* the font to the recycle font.

TABLE 611: `utfsym` Plants and Flowers

	<code>\usym{1F331}</code>		<code>\usym{1F337}</code>		<code>\usym{1F33C}</code>		<code>\usym{1F341}</code>
	<code>\usym{1F332}</code>		<code>\usym{1F338}</code>		<code>\usym{1F33D}</code>		<code>\usym{1F342}</code>
	<code>\usym{1F333}</code>		<code>\usym{1F339}</code>		<code>\usym{1F33E}</code>		<code>\usym{1F343}</code>
	<code>\usym{1F334}</code>		<code>\usym{1F33A}</code>		<code>\usym{1F33F}</code>		<code>\usym{1F3F5}</code>
	<code>\usym{1F335}</code>		<code>\usym{1F33B}</code>		<code>\usym{1F340}</code>		<code>\usym{1F3F6}</code>

All `utfsym` symbols are implemented with `TikZ` graphics, not with a font. In addition to `\usym`, the `utfsym` package defines `\usymH`, which renders a symbol at a given height, and `\usymW`, which renders a symbol at a given width. See the `utfsym` documentation for more information.

TABLE 612: `utfsym` Clothing

	<code>\usym{1F451}</code>		<code>\usym{1F456}</code>		<code>\usym{1F45B}</code>		<code>\usym{1F460}</code>
	<code>\usym{1F452}</code>		<code>\usym{1F457}</code>		<code>\usym{1F45C}</code>		<code>\usym{1F461}</code>
	<code>\usym{1F453}</code>		<code>\usym{1F458}</code>		<code>\usym{1F45D}</code>		<code>\usym{1F462}</code>
	<code>\usym{1F454}</code>		<code>\usym{1F459}</code>		<code>\usym{1F45E}</code>		
	<code>\usym{1F455}</code>		<code>\usym{1F45A}</code>		<code>\usym{1F45F}</code>		

All `utfsym` symbols are implemented with `TikZ` graphics, not with a font. In addition to `\usym`, the `utfsym` package defines `\usymH`, which renders a symbol at a given height, and `\usymW`, which renders a symbol at a given width. See the `utfsym` documentation for more information.

TABLE 613: Miscellaneous `GrNAr2e` Symbols

	<code>\Info</code>		<code>\Request</code>
	<code>\Postbox</code>		<code>\Telephone</code>

TABLE 614: `soyombo` Soyombo Symbols

	<code>\Soyombo</code>		<code>\sA*</code>		<code>\sO*</code>
--	-----------------------	--	-------------------	--	-------------------

\* These symbols require that the `Soyombo` font be active (“`\soyombo ...`”).

TABLE 615: knitting Knitting Symbols

$\wedge$	<code>\textknit{!}</code>	$\Rightarrow$	<code>\textknit{[]}</code>	$\circlearrowleft$	<code>\textknit{Q}</code>
$\Rightarrow$	<code>\textknit{"}</code>	$\Leftarrow$	<code>\textknit{[]}</code>	$\circlearrowright$	<code>\textknit{q}</code>
$\backslash$	<code>\textknit{()}</code>	$\wedge$	<code>\textknit{A}</code>	$\nearrow$	<code>\textknit{R}</code>
$/$	<code>\textknit{()}</code>	$\wedge$	<code>\textknit{a}</code>	$\nwarrow$	<code>\textknit{r}</code>
$*$	<code>\textknit{*}</code>	$\circlearrowleft$	<code>\textknit{B}</code>	$\leftarrow$	<code>\textknit{S}</code>
$ $	<code>\textknit{-}</code>	$\circlearrowright$	<code>\textknit{b}</code>	$\rightarrow$	<code>\textknit{s}</code>
$\wedge$	<code>\textknit{2}</code>	$\Downarrow$	<code>\textknit{E}</code>	$\swarrow$	<code>\textknit{T}</code>
$\wedge$	<code>\textknit{3}</code>	$\curvearrowleft$	<code>\textknit{F}</code>	$\searrow$	<code>\textknit{t}</code>
$\wedge$	<code>\textknit{4}</code>	$\curvearrowright$	<code>\textknit{f}</code>	$\swarrow$	<code>\textknit{U}</code>
$\wedge$	<code>\textknit{5}</code>	$\uparrow$	<code>\textknit{H}</code>	$\nwarrow$	<code>\textknit{u}</code>
$\wedge$	<code>\textknit{6}</code>	$\downarrow$	<code>\textknit{h}</code>	$\vee$	<code>\textknit{V}</code>
$\wedge$	<code>\textknit{7}</code>	$\nearrow$	<code>\textknit{I}</code>	$\vee$	<code>\textknit{v}</code>
$\wedge$	<code>\textknit{8}</code>	$\nearrow$	<code>\textknit{i}</code>	$\swarrow$	<code>\textknit{W}</code>
$\wedge$	<code>\textknit{9}</code>	$\nwarrow$	<code>\textknit{j}</code>	$\vee$	<code>\textknit{w}</code>
$\wedge$	<code>\textknit{:}</code>	$\nearrow$	<code>\textknit{j}</code>	$\swarrow$	<code>\textknit{X}</code>
$\wedge$	<code>\textknit{;}</code>	$\nwarrow$	<code>\textknit{l}</code>	$\swarrow$	<code>\textknit{x}</code>
$\wedge$	<code>\textknit{&lt;}</code>	$\nearrow$	<code>\textknit{l}</code>	$\veevee$	<code>\textknit{Y}</code>
$-$	<code>\textknit{=}</code>	$m$	<code>\textknit{M}</code>	$\succ$	<code>\textknit{y}</code>
$\wedge$	<code>\textknit{&gt;}</code>	$m$	<code>\textknit{m}</code>	$\varnothing\varnothing$	<code>\textknit{Z}</code>
$\bullet$	<code>\textknit{@}</code>	$\circ$	<code>\textknit{o}</code>	$\varnothing\varnothing$	<code>\textknit{z}</code>

The `knitting` package is intended to typeset complete knitting charts. See the `knitting` documentation for more information.

Some symbols behave differently when used as part of a sequence. For example, contrast `\textknit{1}` (“ $\wedge$ ”), `\textknit{11}` (“ $\wedge\wedge$ ”), and `\textknit{111}` (“ $\wedge\wedge\wedge$ ”). Similarly, contrast `\textknit{"}` (“ $\Rightarrow$ ”) and `\textknit{"}"` (“ $\circlearrowright$ ”). Again, see the `knitting` documentation for more information.

TABLE 616: `worldflags` Nautical Symbol Flags

	\worldflag{A}		\worldflag{J}		\worldflag{S}		\worldflag{1}
	\worldflag{B}		\worldflag{K}		\worldflag{T}		\worldflag{2}
	\worldflag{C}		\worldflag{L}		\worldflag{U}		\worldflag{3}
	\worldflag{D}		\worldflag{M}		\worldflag{V}		\worldflag{4}
	\worldflag{E}		\worldflag{N}		\worldflag{W}		\worldflag{5}
	\worldflag{F}		\worldflag{O}		\worldflag{X}		\worldflag{6}
	\worldflag{G}		\worldflag{P}		\worldflag{Y}		\worldflag{7}
	\worldflag{H}		\worldflag{Q}		\worldflag{Z}		\worldflag{8}
	\worldflag{I}		\worldflag{R}		\worldflag{0}		\worldflag{9}

All `worldflags` symbols are implemented with TikZ graphics, not with a font. The package provides a number of options for controlling flag size and style. See the `worldflags` documentation for more information.

TABLE 617: Other `worldflags` Flags

	\worldflag{Buddhism}		\worldflag{NATO}		\worldflag{RedCrystal}
	\worldflag{Christian}		\worldflag{Olympics}		\worldflag{UNESCO}
	\worldflag{Esperanto}		\worldflag{Rainbow}		\worldflag{UNO}
	\worldflag{EU}		\worldflag{RedCrescent}		\worldflag{WB}
	\worldflag{JollyRoger}		\worldflag{RedCross}		\worldflag{WHO}

All `worldflags` symbols are implemented with TikZ graphics, not with a font. The package provides a number of options for controlling flag size and style. See the `worldflags` documentation for more information.

TABLE 618: `twemojis` Non-National Flags

	\twemoji{pirate flag}		\twemoji{transgender flag}
	\twemoji{rainbow flag}		

Most `twemojis` symbols have multiple names. Only the most descriptive name for each symbol is shown in this table.

All `twemojis` symbols are implemented as PDF graphics, not with a font. See also the `hwemoji` package, which enables direct Unicode entry of emoji characters in pdfLATEX; the `emoji` package, which provides a LuaLATEX interface to different underlying emoji fonts; and the `emo` package, which uses a font if possible, otherwise PDF graphics .

TABLE 619: fontawesome5 Flags

	\faFlag		\faFlagCheckered
	\faFlag[regular]		\faFlagUsa

TABLE 620: Miscellaneous arev Symbols

	\anchor		\invsmileface		\skull		\warning
	\biohazard		\radiation		\smileface		\yinyang
	\heavyqleft		\recycle		\steaming		
	\heavyqright		\sadface		\swords		

TABLE 621: twemojis Food Emoji

	\twemoji{avocado}		\twemoji{hot beverage}
	\twemoji{bacon}		\twemoji{hot dog}
	\twemoji{bagel}		\twemoji{hot pepper}
	\twemoji{baguette bread}		\twemoji{ice}
	\twemoji{banana}		\twemoji{ice cream}
	\twemoji{beer mug}		\twemoji{kiwi fruit}
	\twemoji{bell pepper}		\twemoji{leafy green}
	\twemoji{bento box}		\twemoji{lemon}
	\twemoji{beverage box}		\twemoji{lollipop}
	\twemoji{blueberries}		\twemoji{mango}
	\twemoji{bottle with popping cork}		\twemoji{mate}
	\twemoji{bowl with spoon}		\twemoji{meat on bone}
	\twemoji{bread}		\twemoji{melon}
	\twemoji{broccoli}		\twemoji{moon cake}
	\twemoji{bubble tea}		\twemoji{mushroom}
	\twemoji{burrito}		\twemoji{oden}
	\twemoji{butter}		\twemoji{olive}
	\twemoji{candy}		\twemoji{onion}
	\twemoji{canned food}		\twemoji{pancakes}
	\twemoji{carrot}		\twemoji{peach}
	\twemoji{cheese wedge}		\twemoji{peanuts}
	\twemoji{cherries}		\twemoji{pear}
	\twemoji{chocolate bar}		\twemoji{pie}
	\twemoji{chopsticks}		\twemoji{pineapple}
	\twemoji{clinking beer mugs}		\twemoji{pizza}
	\twemoji{clinking glasses}		\twemoji{popcorn}

(continued on next page)

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칵테일 글라스	\twemoji{cocktail glass}	밥 그릇	\twemoji{pot of food}
코코넛	\twemoji{coconut}	감자	\twemoji{potato}
숙성된 쌀	\twemoji{cooked rice}	닭가슴살	\twemoji{poultry leg}
쿠키	\twemoji{cookie}	프레첼	\twemoji{pretzel}
요리	\twemoji{cooking}	빨간 사과	\twemoji{red apple}
크로이상트	\twemoji{croissant}	리스 밸	\twemoji{rice ball}
ucumber	\twemoji{cucumber}	리스 크래커	\twemoji{rice cracker}
컵과 труб	\twemoji{cup with straw}	나물	\twemoji{roasted sweet potato}
케이크	\twemoji{cupcake}	사케	\twemoji{sake}
카리 쌀	\twemoji{curry rice}	מלח	\twemoji{salt}
크림	\twemoji{custard}	샌드위치	\twemoji{sandwich}
_meat	\twemoji{cut of meat}	얕은 그릇	\twemoji{shallow pan of food}
다ango	\twemoji{dango}	샤브샤브	\twemoji{shaved ice}
도넛	\twemoji{doughnut}	_shortcake	\twemoji{shortcake}
만두	\twemoji{dumpling}	소프트 아이스	\twemoji{soft ice cream}
계란	\twemoji{egg}	스paghetti	\twemoji{spaghetti}
고구마	\twemoji{eggplant}	스팀 밸	\twemoji{steaming bowl}
Falafel	\twemoji{falafel}	딸기	\twemoji{strawberry}
fish cake swirl	\twemoji{fish cake with swirl}	uffed flatbread	\twemoji{stuffed flatbread}
플랫브레드	\twemoji{flatbread}	수제비	\twemoji{sushi}
фондue	\twemoji{fondue}	타코	\twemoji{taco}
ork and knife	\twemoji{fork and knife}	takeout box	\twemoji{takeout box}
ork and knife with plate	\twemoji{fork and knife with plate}	타마일	\twemoji{tamale}
운세 쿠키	\twemoji{fortune cookie}	귤	\twemoji{tangerine}
프렌치 fries	\twemoji{french fries}	teacup without handle	\twemoji{teacup without handle}
튀김 새우	\twemoji{fried shrimp}	teapot	\twemoji{teapot}
고arlic	\twemoji{garlic}	토마토	\twemoji{tomato}
milk	\twemoji{glass of milk}	tropical drink	\twemoji{tropical drink}
포도	\twemoji{grapes}	tumbler glass	\twemoji{tumbler glass}
apple	\twemoji{green apple}	와플	\twemoji{waffle}
green salad	\twemoji{green salad}	수박	\twemoji{watermelon}
햄버거	\twemoji{hamburger}	술	\twemoji{wine glass}
honey pot	\twemoji{honey pot}		

Most twemojis symbols have multiple names. Only the most descriptive name for each symbol is shown in this table.

All twemojis symbols are implemented as PDF graphics, not with a font. See also the `hwemoji` package, which enables direct Unicode entry of emoji characters in `pdflATEX`; the `emoji` package, which provides a `LuaLATEX` interface to different underlying emoji fonts; and the `emo` package, which uses a font if possible, otherwise PDF graphics .

TABLE 622: figchild Food and Cooking Symbols

	\fcApple		\fcFrenchFries		\fcPimento
	\fcBarbecue		\fcFridge		\fcPineapple
	\fcBread		\fchamburger		\fcPopsicle
	\fcBrownie		\fcIceCreamA		\fcPotato
	\fcBullet		\fcIceCreamB		\fcPulse
	\fcBurrito		\fcIceCreamC		\fcRoastChicken
	\fcCabbage		\fcIceCreamD		\fcRoller
	\fcCarrot		\fcIceCreamE		\fcScallion
	\fcCarrotA		\fcIceCreamF		\fcScaredEgg
	\fcCashier		\fcIceCreamG		\fcSharpKnife
	\fcCheese		\fcIceCreamH		\fcShell
	\fcCherry		\fcKetchup		\fcShrimp
	\fcChickenThigh		\fcKettle		\fcSpatulas
	\fcCucumber		\fcKnife		\fcSteak
	\fcCupcake		\fcMug		\fcStrawberry
	\fcCupcakeA		\fcMushroom		\fcStrawberryA
	\fcCupcakeB		\fcMushroomA		\fcSugar
	\fcCuttingBoard		\fcMushroomB		\fcTomato
	\fcEgg		\fcNuggets		\fcTony
	\fcEggA		\fcOnion		\fcWatermelon
	\fcEggB		\fcPanA		



\fcEggplant



\fcPanB

All `\figchild` symbols are implemented with `TikZ` graphics, not with a font. Not shown above, each symbol takes three arguments: a scale factor, a line color, and a line thickness. See the `\figchild` documentation for more information.

TABLE 623: `utfsym` Food and Cooking Symbols

⌚	<code>\usym{1F32D}</code>	⌚	<code>\usym{1F350}</code>	⌚	<code>\usym{1F362}</code>	⌚	<code>\usym{1F372}</code>
⌚	<code>\usym{1F32E}</code>	⌚	<code>\usym{1F351}</code>	⌚	<code>\usym{1F363}</code>	⌚	<code>\usym{1F373}</code>
⌚	<code>\usym{1F32F}</code>	⌚	<code>\usym{1F352}</code>	⌚	<code>\usym{1F364}</code>	⌚	<code>\usym{1F374}</code>
⌚	<code>\usym{1F336}</code>	⌚	<code>\usym{1F353}</code>	⌚	<code>\usym{1F365}</code>	⌚	<code>\usym{1F375}</code>
⌚	<code>\usym{1F344}</code>	⌚	<code>\usym{1F354}</code>	⌚	<code>\usym{1F366}</code>	⌚	<code>\usym{1F376}</code>
⌚	<code>\usym{1F345}</code>	⌚	<code>\usym{1F355}</code>	⌚	<code>\usym{1F367}</code>	⌚	<code>\usym{1F377}</code>
⌚	<code>\usym{1F346}</code>	⌚	<code>\usym{1F356}</code>	⌚	<code>\usym{1F368}</code>	⌚	<code>\usym{1F378}</code>
⌚	<code>\usym{1F347}</code>	⌚	<code>\usym{1F357}</code>	⌚	<code>\usym{1F369}</code>	⌚	<code>\usym{1F379}</code>
⌚	<code>\usym{1F348}</code>	⌚	<code>\usym{1F35A}</code>	⌚	<code>\usym{1F36A}</code>	⌚	<code>\usym{1F37A}</code>
⌚	<code>\usym{1F349}</code>	⌚	<code>\usym{1F35B}</code>	⌚	<code>\usym{1F36B}</code>	⌚	<code>\usym{1F37B}</code>
⌚	<code>\usym{1F34A}</code>	⌚	<code>\usym{1F35C}</code>	⌚	<code>\usym{1F36C}</code>	⌚	<code>\usym{1F37C}</code>
⌚	<code>\usym{1F34B}</code>	⌚	<code>\usym{1F35D}</code>	⌚	<code>\usym{1F36D}</code>	⌚	<code>\usym{1F37D}</code>
⌚	<code>\usym{1F34C}</code>	⌚	<code>\usym{1F35E}</code>	⌚	<code>\usym{1F36E}</code>	⌚	<code>\usym{1F37E}</code>
⌚	<code>\usym{1F34D}</code>	⌚	<code>\usym{1F35F}</code>	⌚	<code>\usym{1F36F}</code>	⌚	<code>\usym{1F37F}</code>
⌚	<code>\usym{1F34E}</code>	⌚	<code>\usym{1F360}</code>	⌚	<code>\usym{1F370}</code>	⌚	<code>\usym{1F382}</code>
⌚	<code>\usym{1F34F}</code>	⌚	<code>\usym{1F361}</code>	⌚	<code>\usym{1F371}</code>		

All `utfsym` symbols are implemented with `TikZ` graphics, not with a font. In addition to `\usym`, the `utfsym` package defines `\usymH`, which renders a symbol at a given height, and `\usymW`, which renders a symbol at a given width. See the `utfsym` documentation for more information.

TABLE 624: `cookingsymbols` Cooking Symbols

□	<code>\Bottomheat</code>		<code>\Fork</code>		<code>\Knife</code>	□	<code>\Topbottomheat</code>
○	<code>\Dish</code>		<code>\Gasstove</code>	■	<code>\Oven</code>	□	<code>\Topheat</code>
▣	<code>\Fanoven</code>		<code>\Gloves</code>		<code>\Spoon</code>		

TABLE 625: tikzsymbols Cooking Symbols

■	\bakingplate	!	\eggbeater	▬	\pan	▬	\squeezer
!	\blender	▬	\fryingpan	▬	\peeler	▬	\trident
□	\bottle	▬	\garlicpress	▬	\pot		
⦿	\bowl	▬	\grater	▬	\rollingpin		
☒	\cooker	▬	\oven	▬	\sieve		

tikzsymbols defines German-language aliases for each of the above: \Backblech for \bakingplate, \Bratpfanne for \fryingpan, \Dreizack for \trident, \Flasche for \bottle, \Herd for \cooker, \Kochtopf for \pot, \Knoblauchpresse for \garlicpress, \Nudelholz for \rollingpin, \Ofen for \oven, \Pfanne for \pan, \Purierstab for \blender, \Reibe for \grater, \Saftpresse for \squeezer, \Schaler for \peeler, \Schneebesen for \eggbeater, \Schussel for \bowl, and \Sieb for \sieve.

All tikzsymbols symbols are implemented with TikZ graphics, not with a font.

TABLE 626: tikzsymbols Emoji

☺	\Annoey	☺	\Laughey	☺	\rWalley	☺	\Tongey
😺	\Cat	☺	\Neutrey	☺	\Sadey	😺	\Vomey
😺	\cChangey{1}	😺	\NiceReapey	😺	\SchrodingersCat{0}	😺	\Walley
☺	\Changey{1}	🔴	\Ninja	☺	\Sey	☺	\Winkey
☺	\Cooley	☺	\Nursey	🌐	\Sleepey	☺	\wInnocey
☺	\Innocey	☺	\oldWinkey	☺	\Smiley	☺	\Xey

All tikzsymbols symbols are implemented with TikZ graphics, not with a font. Hence, symbols like \Ninja can include color. In fact, most of the commands shown above accept one or more color arguments for further customization. Also note that \cChangey, \Changey, and \SchrodingersCat take a mandatory argument. See the tikzsymbols documentation for more information.

TABLE 627: tikzsymbols 3D Emoji

☺	\dAnnoey	☺	\dLaughey	☺	\dSadey	☺	\dVomey
😺	\dcChangey{1}	😺	\dNeutrey	😺	\dSey	😺	\dWalley
😺	\dChangey{1}	🔴	\dNinja	🌐	\dSleepey	☺	\dWinkey
☺	\dCooley	☺	\dNursey	☺	\dSmiley	☺	\dKey
☺	\dInnocey	🟡	\drWalley	☺	\dTongey	☺	\olddWinkey

All tikzsymbols symbols are implemented with TikZ graphics, not with a font. Hence, all of the symbols shown above can include color. In fact, each command in Table 627 accepts one or more color arguments for further customization. Note that \dcChangey and \dChangey also take a mandatory argument. See the tikzsymbols documentation for more information.

TABLE 628: `utfsym` Emoji

☺	<code>\usym{1F600}</code>	☺	<code>\usym{1F614}</code>	☺	<code>\usym{1F628}</code>	☺	<code>\usym{1F63C}</code>
☺	<code>\usym{1F601}</code>	☺	<code>\usym{1F615}</code>	☺	<code>\usym{1F629}</code>	☺	<code>\usym{1F63D}</code>
☺	<code>\usym{1F602}</code>	☺	<code>\usym{1F616}</code>	☺	<code>\usym{1F62A}</code>	☺	<code>\usym{1F63E}</code>
☺	<code>\usym{1F603}</code>	☺	<code>\usym{1F617}</code>	☺	<code>\usym{1F62B}</code>	☺	<code>\usym{1F63F}</code>
☺	<code>\usym{1F604}</code>	☺	<code>\usym{1F618}</code>	☺	<code>\usym{1F62C}</code>	☺	<code>\usym{1F640}</code>
☺	<code>\usym{1F605}</code>	☺	<code>\usym{1F619}</code>	☺	<code>\usym{1F62D}</code>	☺	<code>\usym{1F641}</code>
☺	<code>\usym{1F606}</code>	☺	<code>\usym{1F61A}</code>	☺	<code>\usym{1F62E}</code>	☺	<code>\usym{1F642}</code>
☺	<code>\usym{1F607}</code>	☺	<code>\usym{1F61B}</code>	☺	<code>\usym{1F62F}</code>	☺	<code>\usym{1F643}</code>
☺	<code>\usym{1F608}</code>	☺	<code>\usym{1F61C}</code>	☺	<code>\usym{1F630}</code>	☺	<code>\usym{1F644}</code>
☺	<code>\usym{1F609}</code>	☺	<code>\usym{1F61D}</code>	☺	<code>\usym{1F631}</code>	☺	<code>\usym{1F645}</code>
☺	<code>\usym{1F60A}</code>	☺	<code>\usym{1F61E}</code>	☺	<code>\usym{1F632}</code>	☺	<code>\usym{1F646}</code>
☺	<code>\usym{1F60B}</code>	☺	<code>\usym{1F61F}</code>	☺	<code>\usym{1F633}</code>	☺	<code>\usym{1F647}</code>
☺	<code>\usym{1F60C}</code>	☺	<code>\usym{1F620}</code>	☺	<code>\usym{1F634}</code>	☺	<code>\usym{1F648}</code>
☺	<code>\usym{1F60D}</code>	☺	<code>\usym{1F621}</code>	☺	<code>\usym{1F635}</code>	☺	<code>\usym{1F649}</code>
☺	<code>\usym{1F60E}</code>	☺	<code>\usym{1F622}</code>	☺	<code>\usym{1F636}</code>	☺	<code>\usym{1F64A}</code>
☺	<code>\usym{1F60F}</code>	☺	<code>\usym{1F623}</code>	☺	<code>\usym{1F637}</code>	☺	<code>\usym{1F64B}</code>
☺	<code>\usym{1F610}</code>	☺	<code>\usym{1F624}</code>	☺	<code>\usym{1F638}</code>	☺	<code>\usym{1F64C}</code>
☺	<code>\usym{1F611}</code>	☺	<code>\usym{1F625}</code>	☺	<code>\usym{1F639}</code>	☺	<code>\usym{1F64D}</code>
☺	<code>\usym{1F612}</code>	☺	<code>\usym{1F626}</code>	☺	<code>\usym{1F63A}</code>	☺	<code>\usym{1F64E}</code>
☺	<code>\usym{1F613}</code>	☺	<code>\usym{1F627}</code>	☺	<code>\usym{1F63B}</code>	☺	<code>\usym{1F64F}</code>

All `utfsym` symbols are implemented with *TikZ* graphics, not with a font. In addition to `\usym`, the `utfsym` package defines `\usymH`, which renders a symbol at a given height, and `\usymW`, which renders a symbol at a given width. See the `utfsym` documentation for more information.

TABLE 629: `tikzsymbols` Trees

	<code>\Autumntree</code>		<code>\Summertree</code>		<code>\WorstTree</code>
	<code>\Springtree</code>		<code>\Wintertree</code>		

All `tikzsymbols` symbols are implemented with *TikZ* graphics, not with a font. Hence, all of the symbols shown above can include color. `tikzsymbols` additionally defines a `\BasicTree` command that supports customization of trunk and leaf colors. See the `tikzsymbols` documentation for more information.

TABLE 630: `utfsym` Love Symbols

♥	\usym{1F394}	✿	\usym{1F490}	♥	\usym{1F496}	♥	\usym{1F49C}
⌚	\usym{1F48B}	⌚	\usym{1F491}	⌚	\usym{1F497}	⌚	\usym{1F49D}
✿	\usym{1F48C}	✿	\usym{1F492}	✿	\usym{1F498}	✿	\usym{1F49E}
⌚	\usym{1F48D}	⌚	\usym{1F493}	⌚	\usym{1F499}	⌚	\usym{1F49F}
⌚	\usym{1F48E}	⌚	\usym{1F494}	⌚	\usym{1F49A}	⌚	\usym{1F54A}
⌚	\usym{1F48F}	⌚	\usym{1F495}	⌚	\usym{1F49B}	⌚	\usym{1F5A4}

All `utfsym` symbols are implemented with TikZ graphics, not with a font. In addition to `\usym`, the `utfsym` package defines `\usymH`, which renders a symbol at a given height, and `\usymW`, which renders a symbol at a given width. For example, “`\usymH{1F492}{36pt}`” produces



See the `utfsym` documentation for more information.

TABLE 631: Miscellaneous `tikzsymbols` Symbols

🛏	\Bed	🪑	\Chair	🔥	\Fire	⛄	\Snowman	▲	\Tribar
蠟	\Candle	☕	\Coffeecup	🗿	\Moai	👤	\Strichmaxerl		

All `tikzsymbols` symbols are implemented with TikZ graphics, not with a font. `\Tribar` supports customization of the fill color for each bar. `\Strichmaxerl` supports customization of the angles at which the stick figure’s arms and legs are drawn. See the `tikzsymbols` documentation for more information.

TABLE 632: Miscellaneous twemojis Emoji

A	\twemoji{1f1e6}	🧘	\twemoji{man in lotus position}* ~~~~~
B	\twemoji{1f1e7}	♿	\twemoji{man in manual wheelchair}* ~~~~~
C	\twemoji{1f1e8}	𠈌	\twemoji{man in motorized wheelchair}* ~~~~~
D	\twemoji{1f1e9}	🧖	\twemoji{man in steamy room}* ~~~~~
E	\twemoji{1f1ea}	🕴	\twemoji{man in tuxedo}* ~~~~~
F	\twemoji{1f1eb}	⚖	\twemoji{man judge}* ~~~~~

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	\twemoji{1f1ec}		\twemoji{man juggling}* A man juggling
	\twemoji{1f1ed}		\twemoji{man kneeling}* A man kneeling
	\twemoji{1f1ee}		\twemoji{man lifting weights}* A man lifting weights
	\twemoji{1f1ef}		\twemoji{man mage}* A man mage
	\twemoji{1f1f0}		\twemoji{man mechanic}* A man mechanic
	\twemoji{1f1f1}		\twemoji{man office worker}* A man office worker
	\twemoji{1f1f2}		\twemoji{man pilot}* A man pilot
	\twemoji{1f1f3}		\twemoji{man playing handball}* A man playing handball
	\twemoji{1f1f4}		\twemoji{man playing water polo}* A man playing water polo
	\twemoji{1f1f5}		\twemoji{man police officer}* A man police officer
	\twemoji{1f1f6}		\twemoji{man pouting}* A man pouting
	\twemoji{1f1f7}		\twemoji{man raising hand}* A man raising hand
	\twemoji{1f1f8}		\twemoji{man running}* A man running
	\twemoji{1f1f9}		\twemoji{man scientist}* A man scientist
	\twemoji{1f1fa}		\twemoji{man shrugging}* A man shrugging
	\twemoji{1f1fb}		\twemoji{man singer}* A man singer
	\twemoji{1f1fc}		\twemoji{man standing}* A man standing
	\twemoji{1f1fd}		\twemoji{man student}* A man student
	\twemoji{1f1fe}		\twemoji{man superhero}* A man superhero
	\twemoji{1f1ff}		\twemoji{man supervillain}* A man supervillain
	\twemoji{1f468-1f3fb-200d-1f384}		\twemoji{man surfing}* A man surfing
	\twemoji{1f468-1f3fc-200d-1f384}		\twemoji{man swimming}* A man swimming
	\twemoji{1f468-1f3fd-200d-1f384}		\twemoji{man teacher}* A man teacher
	\twemoji{1f468-1f3fe-200d-1f384}		\twemoji{man technologist}* A man technologist
	\twemoji{1f468-1f3ff-200d-1f384}		\twemoji{man tipping hand}* A man tipping hand
	\twemoji{1f468-200d-1f384}		\twemoji{man vampire}* A man vampire
	\twemoji{1f469-1f3fb-200d-1f384}		\twemoji{man walking}* A man walking
	\twemoji{1f469-1f3fc-200d-1f384}		\twemoji{man wearing turban}* A man wearing turban
	\twemoji{1f469-1f3fd-200d-1f384}		\twemoji{man with veil}* A man with veil
	\twemoji{1f469-1f3fe-200d-1f384}		\twemoji{man with white cane}* A man with white cane
	\twemoji{1f469-1f3ff-200d-1f384}		\twemoji{man zombie} A man zombie
	\twemoji{1f469-200d-1f384}		\twemoji{man's shoe} A man's shoe
	\twemoji{1f574-1f3fb-200d-2640-fe0f}		\twemoji{manual wheelchair} A manual wheelchair
	\twemoji{1f574-1f3fb-200d-2642-fe0f}		\twemoji{map of Japan} A map of Japan
	\twemoji{1f574-1f3fc-200d-2640-fe0f}		\twemoji{maple leaf} A maple leaf
	\twemoji{1f574-1f3fc-200d-2642-fe0f}		\twemoji{martial arts uniform} A martial arts uniform
	\twemoji{1f574-1f3fd-200d-2640-fe0f}		\twemoji{mechanic}* A mechanic
	\twemoji{1f574-1f3fd-200d-2642-fe0f}		\twemoji{mechanical arm} A mechanical arm
	\twemoji{1f574-1f3fe-200d-2640-fe0f}		\twemoji{mechanical leg} A mechanical leg
	\twemoji{1f574-1f3fe-200d-2642-fe0f}		\twemoji{medical symbol} A medical symbol
	\twemoji{1f574-1f3ff-200d-2640-fe0f}		\twemoji{medium skin tone} Medium skin tone
	\twemoji{1f574-1f3ff-200d-2642-fe0f}		\twemoji{medium-dark skin tone} Medium-dark skin tone
	\twemoji{1f574-fe0f-200d-2640-fe0f}		\twemoji{medium-light skin tone} Medium-light skin tone
	\twemoji{1f574-fe0f-200d-2642-fe0f}		\twemoji{megaphone} A megaphone
	\twemoji{1f576}		\twemoji{men holding hands}* Men holding hands
	\twemoji{1f6cf}		\twemoji{men with bunny ears} Men with bunny ears

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🏅	\twemoji{1st place medal}	🏅	\twemoji{men wrestling}
🥇	\twemoji{26f7-1f3fb}	🚹	\twemoji{men's room}
🥈	\twemoji{26f7-1f3fc}	🕎	\twemoji{menorah}
🥉	\twemoji{26f7-1f3fd}	🧜	\twemoji{mermaid}* 🧜
➤	\twemoji{26f7-1f3fe}	🧜	\twemoji{merman}* 🧜
➤	\twemoji{26f7-1f3ff}	🧜	\twemoji{merperson}* 🧜
🎤	\twemoji{270f}	🎤	\twemoji{microphone}
🏅	\twemoji{2nd place medal}	🔬	\twemoji{microscope}
🏅	\twemoji{3rd place medal}	👉	\twemoji{middle finger}* 👉
🅰️	\twemoji{A button (blood type)}	🪖	\twemoji{military helmet}
🆎	\twemoji{AB button (blood type)}	🎖	\twemoji{military medal}
taboola	\twemoji{abacus}	🌌	\twemoji{milky way}
🎹	\twemoji{accordion}	-	\twemoji{minus}
🩹	\twemoji{adhesive bandage}	ogl	\twemoji{mirror}
🎟	\twemoji{admission tickets}	📱	\twemoji{mobile phone}
Potion	\twemoji{alembic}	📴	\twemoji{mobile phone off}
👽	\twemoji{alien}	📲	\twemoji{mobile phone with arrow}
👾	\twemoji{alien monster}	💰	\twemoji{money bag}
🏈	\twemoji{american football}	💸	\twemoji{money with wings}
🏺	\twemoji{amphora}	🤑	\twemoji{money-mouth face}
心血	\twemoji{anatomical heart}	🎑	\twemoji{moon viewing ceremony}
⚓	\twemoji{anchor}	🪜	\twemoji{mosque}
💢	\twemoji{anger symbol}	🦢	\twemoji{motorized wheelchair}
😡	\twemoji{angry face}	🗻	\twemoji{mount fuji}
😈	\twemoji{angry face with horns}	⛰	\twemoji{mountain}
愀	\twemoji{anguished face}	덫	\twemoji{mouse trap}
📶	\twemoji{antenna bars}	👄	\twemoji{mouth}
💦	\twemoji{anxious face with sweat}	🎥	\twemoji{movie camera}
♒	\twemoji{Aquarius}	⺠	\twemoji{moyai}
♈	\twemoji{Aries}	🤶	\twemoji{Mrs. Claus}* 🤶
🎨	\twemoji{artist}	✖	\twemoji{multiply}
🎨	\twemoji{artist palette}	🎹	\twemoji{musical keyboard}
😲	\twemoji{astonished face}	🎵	\twemoji{musical note}
🚀	\twemoji{astronaut}* 🏧	🎶	\twemoji{musical notes}
🏧	\twemoji{ATM sign}	🎼	\twemoji{musical score}
⚛	\twemoji{atom symbol}	🔇	\twemoji{muted speaker}
🔪	\twemoji{axe}	👤	\twemoji{mx claus}* 👤
🅱️	\twemoji{B button (blood type)}	💅	\twemoji{nail polish}* 💅
👶	\twemoji{baby}* 👼	📛	\twemoji{name badge}
👼	\twemoji{baby angel}* 🍼	🏞	\twemoji{national park}
🍼	\twemoji{baby bottle}	🤢	\twemoji{nauseated face}
🚼	\twemoji{baby symbol}	🧿	\twemoji{nazar amulet}
⬅	\twemoji{BACK arrow}	👔	\twemoji{necktie}
👉	\twemoji{backhand index pointing down}* ➡	🤓	\twemoji{nerd face}

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👉 \twemoji{backhand index pointing left}* 👉 \twemoji{backhand index pointing right}* 👉 \twemoji{backhand index pointing up}* 🎒 \twemoji{backpack} 🏸 \twemoji{badminton} ⚖ \twemoji{balance scale} 髢 \twemoji{bald} 🦶 \twemoji{ballet shoes} 🎈 \twemoji{balloon} 🗳 \twemoji{ballot box with ballot} 🎸 \twemoji{banjo} 🏦 \twemoji{bank} 📊 \twemoji{bar chart} 💈 \twemoji{barber pole} ⚾ \twemoji{baseball} 🏀 \twemoji{basket} 🏀 \twemoji{basketball} 🛁 \twemoji{bathtub}	🎎 \twemoji{nesting dolls} 😐 \twemoji{neutral face} 🆕 \twemoji{NEW button} 📰 \twemoji{newspaper} ⏭ \twemoji{next track button} 🆖 \twemoji{NG button} 🌃 \twemoji{night with stars} 🥋 \twemoji{ninja}* 🚫 \twemoji{no entry} 🚏 \twemoji{no littering} 📳 \twemoji{no mobile phones} 🔞 \twemoji{no one under eighteen} 🚶 \twemoji{no pedestrians} 🚭 \twemoji{no smoking} 🚯 \twemoji{non-potable water} 👃 \twemoji{nose}* 📔 \twemoji{notebook} 📕 \twemoji{notebook with decorative cover} 🔩 \twemoji{nut and bolt} 🅾 \twemoji{O button (blood type)} 🏢 \twemoji{office building}
🔋 \twemoji{battery} 🏖 \twemoji{beach with umbrella} 😊 \twemoji{beaming face with smiling eyes} ❤ \twemoji{beating heart} 🔔 \twemoji{bell} 🔔 \twemoji{bell with slash} 🛎 \twemoji{bellhop bell} 👙 \twemoji{bikini} 🧢 \twemoji{billed cap} ☣ \twemoji{biohazard} 🎂 \twemoji{birthday cake} 🐂 \twemoji{bison} ● \twemoji{black circle} 🚩 \twemoji{black flag} ❤ \twemoji{black heart} ■ \twemoji{black large square} ■ \twemoji{black medium square} ■ \twemoji{black medium-small square} ✒ \twemoji{black nib} ▪ \twemoji{black small square}	👩 \twemoji{office worker}* 👹 \twemoji{ogre} 🛢 \twemoji{oil drum} 🆗 \twemoji{OK button} 👌 \twemoji{OK hand}* 🗝 \twemoji{old key} 👴 \twemoji{old man}* 👵 \twemoji{old woman}* 👵 \twemoji{older person}* 🕉 \twemoji{om} 🔛 \twemoji{ON! arrow} ✊ \twemoji{oncoming fist}* 上游 \twemoji{one-piece swimsuit} 📖 \twemoji{open book} 📁 \twemoji{open file folder} 👋 \twemoji{open hands}* 📬 \twemoji{open mailbox with lowered flag} 📭 \twemoji{open mailbox with raised flag}
◻ \twemoji{black square button}	

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✿	\twemoji{blossom}
📘	\twemoji{blue book}
🌐	\twemoji{blue circle}
❤️	\twemoji{blue heart}
📘	\twemoji{blue square}
💣	\twemoji{bomb}
✍️	\twemoji{bone}
🔖	\twemoji{bookmark}
📑	\twemoji{bookmark tabs}
📚	\twemoji{books}
🌈	\twemoji{boomerang}
💐	\twemoji{bouquet}
🏹	\twemoji{bow and arrow}
🎳	\twemoji{bowling}
🥊	\twemoji{boxing glove}
👦	\twemoji{boy}*
🧠	\twemoji{brain}
🤱	\twemoji{breast-feeding}*
🧱	\twemoji{bricks}
🌉	\twemoji{bridge at night}
💼	\twemoji{briefcase}
👙	\twemoji{briefs}
☀️	\twemoji{bright button}
💔	\twemoji{broken heart}
🧹	\twemoji{broom}
🟤	\twemoji{brown circle}
🟧	\twemoji{brown heart}
🟦	\twemoji{brown square}
🪗	\twemoji{bucket}
🏗️	\twemoji{building construction}
🎯	\twemoji{bullseye}
👤	\twemoji{bust in silhouette}
👤	\twemoji{busts in silhouette}
🌵	\twemoji{cactus}
👉	\twemoji{call me hand}*
📷	\twemoji{camera}
📸	\twemoji{camera with flash}
🏕️	\twemoji{camping}
♋	\twemoji{Cancer}
🕯️	\twemoji{candle}
♑	\twemoji{Capricorn}
🗃️	\twemoji{card file box}
📁	\twemoji{card index}
📁	\twemoji{card index dividers}
🎠	\twemoji{carousel horse}
🎏	\twemoji{carp streamer}
⛎	\twemoji{Ophiuchus}
💿	\twemoji{optical disk}
📀	\twemoji{orange book}
🟩	\twemoji{orange circle}
🟧	\twemoji{orange heart}
🟨	\twemoji{orange square}
☦	\twemoji{orthodox cross}
📤	\twemoji{outbox tray}
🖨️	\twemoji{P button}
📦	\twemoji{package}
📄	\twemoji{page facing up}
📄	\twemoji{page with curl}
🖨️	\twemoji{pager}
🖌️	\twemoji{paintbrush}
🌴	\twemoji{palm tree}
🍀	\twemoji{palms up together}*
📎	\twemoji{paperclip}
🪟	\twemoji{parachute}
〽️	\twemoji{part alternation mark}
🎉	\twemoji{party popper}
🥳	\twemoji{partying face}
⏸️	\twemoji{pause button}
☮️	\twemoji{peace symbol}
✍️	\twemoji{pen}
📝	\twemoji{pencil}
🤔	\twemoji{pensive face}
🤝	\twemoji{people holding hands}*
🤗	\twemoji{people hugging}
🐰	\twemoji{people with bunny ears}
🤼	\twemoji{people wrestling}
🎭	\twemoji{performing arts}
💪	\twemoji{persevering face}
👤	\twemoji{person}*
⛹️	\twemoji{person bouncing ball}*
🙇	\twemoji{person bowing}*
🤸	\twemoji{person cartwheeling}*
🧗	\twemoji{person climbing}*
🤦	\twemoji{person facepalming}*
👶	\twemoji{person feeding baby}*
🤺	\twemoji{person fencing}
🙍	\twemoji{person frowning}*
🤷	\twemoji{person gesturing NO}*
🤷	\twemoji{person gesturing OK}*
💇	\twemoji{person getting haircut}*
💆	\twemoji{person getting massage}*
🏌️	\twemoji{person golfing}*

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	\twemoji{carpentry saw}
	\twemoji{castle}
	\twemoji{cat with tears of joy}
	\twemoji{cat with wry smile}
	\twemoji{chains}
	\twemoji{chair}
	\twemoji{chart decreasing}
	\twemoji{chart increasing}
	\twemoji{chart increasing with yen}
	\twemoji{check box with check}
	\twemoji{check mark}
	\twemoji{check mark button}
	\twemoji{chequered flag}
	\twemoji{cherry blossom}
	\twemoji{chess pawn}
	\twemoji{chestnut}
	\twemoji{child}* * indicates this is a variation sequence
	\twemoji{children crossing}
	\twemoji{Christmas tree}
	\twemoji{church}
	\twemoji{cigarette}
	\twemoji{cinema}
	\twemoji{circled M}
	\twemoji{circus tent}
	\twemoji{cityscape}
	\twemoji{cityscape at dusk}
	\twemoji{CL button}
	\twemoji{clamp}
	\twemoji{clapper board}
	\twemoji{clapping hands}* * indicates this is a variation sequence
	\twemoji{classical building}
	\twemoji{clipboard}
	\twemoji{clockwise vertical arrows}
	\twemoji{closed book}
	\twemoji{closed mailbox with lowered flag}
	\twemoji{closed mailbox with raised flag}
	\twemoji{closed umbrella}
	\twemoji{clown face}
	\twemoji{clutch bag}
	\twemoji{coat}
	\twemoji{coffin}
	\twemoji{coin}
	\twemoji{person in bed}* * indicates this is a variation sequence
	\twemoji{person in lotus position}* * indicates this is a variation sequence
	\twemoji{person in manual wheelchair}* * indicates this is a variation sequence
	\twemoji{person in motorized wheelchair}* * indicates this is a variation sequence
	\twemoji{person in steamy room}* * indicates this is a variation sequence
	\twemoji{person in suit levitating}* * indicates this is a variation sequence
	\twemoji{person in tuxedo}* * indicates this is a variation sequence
	\twemoji{person juggling}* * indicates this is a variation sequence
	\twemoji{person kneeling}* * indicates this is a variation sequence
	\twemoji{person lifting weights}* * indicates this is a variation sequence
	\twemoji{person playing handball}* * indicates this is a variation sequence
	\twemoji{person playing water polo}* * indicates this is a variation sequence
	\twemoji{person pouting}* * indicates this is a variation sequence
	\twemoji{person raising hand}* * indicates this is a variation sequence
	\twemoji{person running}* * indicates this is a variation sequence
	\twemoji{person shrugging}* * indicates this is a variation sequence
	\twemoji{person standing}* * indicates this is a variation sequence
	\twemoji{person surfing}* * indicates this is a variation sequence
	\twemoji{person swimming}* * indicates this is a variation sequence
	\twemoji{person taking bath}* * indicates this is a variation sequence
	\twemoji{person tipping hand}* * indicates this is a variation sequence
	\twemoji{person walking}* * indicates this is a variation sequence
	\twemoji{person wearing turban}* * indicates this is a variation sequence
	\twemoji{person with skullcap}* * indicates this is a variation sequence
	\twemoji{person with veil}* * indicates this is a variation sequence
	\twemoji{person with white cane}* * indicates this is a variation sequence
	\twemoji{petri dish}
	\twemoji{pick}
	\twemoji{pile of poo}
	\twemoji{pill}
	\twemoji{pilot}* * indicates this is a variation sequence
	\twemoji{pinched fingers}* * indicates this is a variation sequence
	\twemoji{pinching hand}* * indicates this is a variation sequence
	\twemoji{pine decoration}
	\twemoji{ping pong}
	\twemoji{Pisces}
	\twemoji{piñata}
	\twemoji{placard}
	\twemoji{place of worship}
	\twemoji{play button}
	\twemoji{play or pause button}
	\twemoji{pleading face}

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🥶	\twemoji{cold face}
💥	\twemoji{collision}
☄	\twemoji{comet}
🧭	\twemoji{compass}
💻	\twemoji{computer}
💽	\twemoji{computer disk}
🖱️	\twemoji{computer mouse}
🎉	\twemoji{confetti ball}
🥳	\twemoji{confounded face}
🤔	\twemoji{confused face}
👷	\twemoji{construction worker}* * indicates a variation of a standard emoji
🎛️	\twemoji{control knobs}
🏪	\twemoji{convenience store}
🏆	\twemoji{cook}* * indicates a variation of a standard emoji
🆒	\twemoji{COOL button}
⌚	\twemoji{copyright}
🛋️	\twemoji{couch and lamp}
🔃	\twemoji{counterclockwise arrows button}
👫	\twemoji{couple with heart}* * indicates a variation of a standard emoji
💏	\twemoji{couplekiss}
🤠	\twemoji{cowboy hat face}
🖍️	\twemoji{crayon}
💳	\twemoji{credit card}
🏏	\twemoji{cricket game}
✖	\twemoji{cross mark}
☒	\twemoji{cross mark button}
🖕	\twemoji{crossed fingers}* * indicates a variation of a standard emoji
🚩	\twemoji{crossed flags}
⚔️	\twemoji{crossed swords}
👑	\twemoji{crown}
😿	\twemoji{crying cat}
😢	\twemoji{crying face}
🔮	\twemoji{crystal ball}
🪧	\twemoji{curling stone}
➰	\twemoji{curly hair}
➿	\twemoji{curly loop}
💱	\twemoji{currency exchange}
🌀	\twemoji{cyclone}
🗡️	\twemoji{dagger}
黝	\twemoji{dark skin tone}
💨	\twemoji{dashing away}
📅	\twemoji{date}
👤	\twemoji{deaf man}* * indicates a variation of a standard emoji
🧑‍🦬	\twemoji{deaf person}* * indicates a variation of a standard emoji
聋	\twemoji{deaf woman}* * indicates a variation of a standard emoji
✓	\twemoji{plunger}
➕	\twemoji{plus}
👮	\twemoji{police officer}* * indicates a variation of a standard emoji
🎱	\twemoji{pool 8 ball}
🏤	\twemoji{post office}
📇	\twemoji{postal horn}
📮	\twemoji{postbox}
💧	\twemoji{potable water}
🍓	\twemoji{potted plant}
💷	\twemoji{pound banknote}
Pussy	\twemoji{pouting cat}
😡	\twemoji{pouting face}
唪	\twemoji{prayer beads}
🤰	\twemoji{pregnant woman}* * indicates a variation of a standard emoji
🤴	\twemoji{prince}* * indicates a variation of a standard emoji
👸	\twemoji{princess}* * indicates a variation of a standard emoji
🖨️	\twemoji{printer}
🚫	\twemoji{prohibited}
🟣	\twemoji{purple circle}
🟤	\twemoji{purple heart}
🟧	\twemoji{purple square}
PURSE	\twemoji{purse}
📌	\twemoji{pushpin}
🧩	\twemoji{puzzle piece}
📻	\twemoji{radio}
📻	\twemoji{radio button}
☣	\twemoji{radioactive}
🌈	\twemoji{rainbow}
✋	\twemoji{raised back of hand}* * indicates a variation of a standard emoji
✊	\twemoji{raised fist}* * indicates a variation of a standard emoji
✋	\twemoji{raised hand}* * indicates a variation of a standard emoji
🙌	\twemoji{raising hands}* * indicates a variation of a standard emoji
剃刀	\twemoji{razor}
ceipt	\twemoji{receipt}
🎵	\twemoji{record button}
♻️	\twemoji{recycling symbol}
🔴	\twemoji{red circle}
封	\twemoji{red envelope}
❗	\twemoji{red exclamation mark}
🔴	\twemoji{red hair}
❤	\twemoji{red heart}
🏮	\twemoji{red paper lantern}
❓	\twemoji{red question mark}
🔴	\twemoji{red square}
▼	\twemoji{red triangle pointed down}

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🌳	\twemoji{deciduous tree}
🏬	\twemoji{department store}
🏚	\twemoji{derelict house}
🏜	\twemoji{desert}
🏝	\twemoji{desert island}
💻	\twemoji{desktop computer}
🕵	\twemoji{detective}* * indicates a variation of a standard emoji
❖	\twemoji{diamond with a dot}
☀	\twemoji{dim button}
😞	\twemoji{disappointed face}
瞞	\twemoji{disguised face}
÷	\twemoji{divide}
suce	\twemoji{diving mask}
🏮	\twemoji{diya lamp}
昡	\twemoji{dizzy}
🧍	\twemoji{dna}
💵	\twemoji{dollar banknote}
🚪	\twemoji{door}
🔯	\twemoji{dotted six-pointed star}
♾	\twemoji{double curly loop}
❗❗	\twemoji{double exclamation mark}
🕊	\twemoji{dove}
⬇	\twemoji{down arrow}
⬅	\twemoji{down-left arrow}
➡	\twemoji{down-right arrow}
😓	\twemoji{downcast face with sweat}
⬇️	\twemoji{downwards button}
👗	\twemoji{dress}
💦	\twemoji{drooling face}
滴	\twemoji{drop of blood}
💧	\twemoji{droplet}
🥁	\twemoji{drum}
📀	\twemoji{dvd}
✉	\twemoji{e-mail}
📠	\twemoji{e50a}
👂	\twemoji{ear}* * indicates a variation of a standard emoji
🌽	\twemoji{ear of corn}
聋	\twemoji{ear with hearing aid}* * indicates a variation of a standard emoji
*	\twemoji{eight-pointed star}
✳	\twemoji{eight-spoked asterisk}
⏏	\twemoji{eject button}
⚡	\twemoji{electric plug}
𨢁	\twemoji{elevator}
🧙	\twemoji{elf}* * indicates a variation of a standard emoji
🔚	\twemoji{END arrow}
▲	\twemoji{red triangle pointed up}
REGISTERED TRADE MARK	\twemoji{registered}
😌	\twemoji{relieved face}
🎗	\twemoji{reminder ribbon}
🔁	\twemoji{repeat button}
🔂	\twemoji{repeat single button}
⛑	\twemoji{rescue worker's helmet}
🚻	\twemoji{restroom}
◀	\twemoji{reverse button}
❤	\twemoji{revolving hearts}
🎀	\twemoji{ribbon}
💥	\twemoji{right anger bubble}
↗	\twemoji{right arrow}
➡️	\twemoji{right arrow curving down}
➡️	\twemoji{right arrow curving left}
➡️	\twemoji{right arrow curving up}
👉	\twemoji{right-facing fist}* * indicates a variation of a standard emoji
💍	\twemoji{ring}
☄	\twemoji{ringed planet}
🤖	\twemoji{robot}
🗿	\twemoji{rock}
🗞	\twemoji{roll of paper}
🗞	\twemoji{rolled-up newspaper}
🎢	\twemoji{roller coaster}
🤣	\twemoji{rolling on the floor laughing}
🌹	\twemoji{rose}
🏵	\twemoji{rosette}
📍	\twemoji{round pushpin}
🏉	\twemoji{rugby football}
🏃	\twemoji{running shirt}
👟	\twemoji{running shoe}
😢	\twemoji{sad but relieved face}
­safety pin	\twemoji{safety pin}
­safety vest	\twemoji{safety vest}
♐	\twemoji{Sagittarius}
⛵	\twemoji{sailboat}
🎅	\twemoji{Santa Claus}* * indicates a variation of a standard emoji
­sari	\twemoji{sari}
📡	\twemoji{satellite antenna}
🎷	\twemoji{saxophone}
🧣	\twemoji{scarf}
🏫	\twemoji{school}
­i	\twemoji{scientist}* * indicates a variation of a standard emoji
issors	\twemoji{scissors}
♏	\twemoji{scorpius}

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✉	\twemoji{envelope}	\twemoji{screwdriver}
✉️	\twemoji{envelope with arrow}	\twemoji{scroll}
💶	\twemoji{euro banknote}	\twemoji{seat}
🎄	\twemoji{evergreen tree}	\twemoji{see-no-evil monkey}
❗	\twemoji{exclamation question mark}	\twemoji{seedling}
🤯	\twemoji{exploding head}	\twemoji{selfie}* *
😐	\twemoji{expressionless face}	\twemoji{sewing needle}
👁	\twemoji{eye}	\twemoji{shamrock}
👁️	\twemoji{eye in speech bubble}	\twemoji{sheaf of rice}
👓	\twemoji{eyeglasses}	\twemoji{shield}
👀	\twemoji{eyes}	\twemoji{shinto shrine}
😘	\twemoji{face blowing a kiss}	\twemoji{shooting star}
😋	\twemoji{face savoring food}	\twemoji{shopping bags}
😱	\twemoji{face screaming in fear}	\twemoji{shopping cart}
🤮	\twemoji{face vomiting}	\twemoji{shorts}
💩	\twemoji{face with hand over mouth}	\twemoji{shower}
🤕	\twemoji{face with head-bandage}	\twemoji{shuffle tracks button}
😷	\twemoji{face with medical mask}	\twemoji{shushing face}
😎	\twemoji{face with monocle}	\twemoji{sign of the horns}* *
😃	\twemoji{face with open mouth}	\twemoji{singer}* *
🤨	\twemoji{face with raised eyebrow}	\twemoji{skier}
🧐	\twemoji{face with rolling eyes}	\twemoji{skis}
😤	\twemoji{face with steam from nose}	\twemoji{skull}
😡	\twemoji{face with symbols on mouth}	\twemoji{skull and crossbones}
😂	\twemoji{face with tears of joy}	\twemoji{sleeping face}
🤒	\twemoji{face with thermometer}	\twemoji{sleepy face}
😛	\twemoji{face with tongue}	\twemoji{slightly frowning face}
😶	\twemoji{face without mouth}	\twemoji{slightly smiling face}
🏭	\twemoji{factory}	\twemoji{slot machine}
⼯	\twemoji{factory worker}* *	◆ \twemoji{small blue diamond}
🧞	\twemoji{fairy}* *	◆ \twemoji{small orange diamond}
🍂	\twemoji{fallen leaf}	\twemoji{smiling cat with heart-eyes}
👨‍👩‍👧‍👦	\twemoji{family}* *	\twemoji{smiling face}
👨‍🌾	\twemoji{farmer}* *	\twemoji{smiling face with halo}
⬇	\twemoji{fast down button}	\twemoji{smiling face with heart-eyes}
⏪	\twemoji{fast reverse button}	\twemoji{smiling face with hearts}
⏫	\twemoji{fast up button}	\twemoji{smiling face with horns}
⏩	\twemoji{fast-forward button}	\twemoji{smiling face with smiling eyes}
📠	\twemoji{fax machine}	\twemoji{smiling face with sunglasses}
🤩	\twemoji{fearful face}	\twemoji{smiling face with tear}
ธ	\twemoji{feather}	\twemoji{smirking face}

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♀	\twemoji{female sign}	😷	\twemoji{sneezing face}
🎡	\twemoji{ferris wheel}	🏔	\twemoji{snow-capped mountain}
⛴	\twemoji{ferry}	🏂	\twemoji{snowboarder}* 🏂
🏒	\twemoji{field hockey}	❄	\twemoji{snowflake}
🗄	\twemoji{file cabinet}	☃	\twemoji{snowman}
📁	\twemoji{file folder}	⛄	\twemoji{snowman without snow}
🎞	\twemoji{film frames}	🧼	\twemoji{soap}
📽	\twemoji{film projector}	⚽	\twemoji{soccer ball}
🔥	\twemoji{fire}	🧦	\twemoji{socks}
🔥	\twemoji{fire extinguisher}	⚾	\twemoji{softball}
🧨	\twemoji{firecracker}	➡	\twemoji{SOON arrow}
🚒	\twemoji{firefighter}* 🚒	🆘	\twemoji{SOS button}
🎆	\twemoji{fireworks}	✳	\twemoji{sparkle}
🎣	\twemoji{fishing pole}	🎇	\twemoji{sparkler}
🚩	\twemoji{flag in hole}	✨	\twemoji{sparkles}
🔦	\twemoji{flashlight}	💖	\twemoji{sparkling heart}
👞	\twemoji{flat shoe}	🙊	\twemoji{speak-no-evil monkey}
⚜	\twemoji{fleur-de-lis}	🔊	\twemoji{speaker high volume}
💪	\twemoji{flexed biceps}* 💪	🔉	\twemoji{speaker low volume}
💾	\twemoji{floppy disk}	🔊	\twemoji{speaker medium volume}
🎴	\twemoji{flower playing cards}	🗣	\twemoji{speaking head}
😳	\twemoji{flushed face}	💬	\twemoji{speech balloon}
🏀	\twemoji{flying disc}	🕷	\twemoji{spider}
🌁	\twemoji{foggy}	🕸	\twemoji{spider web}
🙏	\twemoji{folded hands}* 🙏	📅	\twemoji{spiral calendar}
🦶	\twemoji{foot}* 🦶	🗒	\twemoji{spiral notepad}
👣	\twemoji{footprints}	🧻	\twemoji{sponge}
⛲	\twemoji{fountain}	🥄	\twemoji{spoon}
🖋	\twemoji{fountain pen}	🏅	\twemoji{sports medal}
🍀	\twemoji{four leaf clover}	瞞	\twemoji{squinting face with tongue}
🖼	\twemoji{framed picture}	🏟	\twemoji{stadium}
🆓	\twemoji{FREE button}	⭐	\twemoji{star}
(;'	\twemoji{frowning face}	🌙	\twemoji{star and crescent}
(;'	\twemoji{frowning face with open mouth}	✡	\twemoji{star of David}
⛽	\twemoji{fuel pump}	😍	\twemoji{star-struck}
🏺	\twemoji{funeral urn}	🗽	\twemoji{Statue of Liberty}
🎲	\twemoji{game die}	ঔ	\twemoji{stethoscope}
⚙	\twemoji{gear}	⏹	\twemoji{stop button}
💎	\twemoji{gem stone}	🛑	\twemoji{stop sign}
♊	\twemoji{Gemini}	📏	\twemoji{straight ruler}
🧞	\twemoji{genie}	🎓	\twemoji{student}* 🎓
👻	\twemoji{ghost}	🎙	\twemoji{studio microphone}
👼	\twemoji{girl}* 👼	☀	\twemoji{sun with face}
🌐	\twemoji{globe showing Americas}	🌻	\twemoji{sunflower}

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🌐	\twemoji{globe showing Asia-Australia}	🌅	\twemoji{sunrise}
🌐	\twemoji{globe showing Europe-Africa}	🌄	\twemoji{sunrise over mountains}
🌐	\twemoji{globe with meridians}	🌆	\twemoji{sunset}
🧤	\twemoji{gloves}	🦸	\twemoji{superhero}* 🦸
🌟	\twemoji{glowing star}	🧙	\twemoji{supervillain}* 🧙
🥎	\twemoji{goal net}	💦	\twemoji{sweat droplets}
👺	\twemoji{goblin}	🕧	\twemoji{synagogue}
แว	\twemoji{goggles}	💉	\twemoji{syringe}
🎓	\twemoji{graduation cap}	👕	\twemoji{t-shirt}
📘	\twemoji{green book}	🎋	\twemoji{tanabata tree}
🟢	\twemoji{green circle}	♉	\twemoji{Taurus}
❤️	\twemoji{green heart}	🏫	\twemoji{teacher}* 🏫
🟩	\twemoji{green square}	📅	\twemoji{tear-off calendar}
😃	\twemoji{grimacing face}	🧑‍💻	\twemoji{technologist}* 🧑‍💻
😺	\twemoji{grinning cat}	🧸	\twemoji{teddy bear}
😺	\twemoji{grinning cat with smiling eyes}	☎️	\twemoji{telephone}
😊	\twemoji{grinning face}	📞	\twemoji{telephone receiver}
😊	\twemoji{grinning face with big eyes}	🔭	\twemoji{telescope}
😊	\twemoji{grinning face with smiling eyes}	📺	\twemoji{television}
😅	\twemoji{grinning face with sweat}	🎾	\twemoji{tennis}
😅	\twemoji{grinning squinting face}	⛺️	\twemoji{tent}
❤️	\twemoji{growing heart}	🧪	\twemoji{test tube}
💂	\twemoji{guard}* 💂	🤔	\twemoji{thinking face}
🎸	\twemoji{guitar}	🩱	\twemoji{thong sandal}
🔨	\twemoji{hammer}	💭	\twemoji{thought balloon}
🛠	\twemoji{hammer and pick}	🧵	\twemoji{thread}
🛠	\twemoji{hammer and wrench}	👎	\twemoji{thumbs down}* 👎
👋	\twemoji{hand with fingers splayed}* 👋	👍	\twemoji{thumbs up}* 👍
👜	\twemoji{handbag}	🎫	\twemoji{ticket}
🤝	\twemoji{handshake}	😩	\twemoji{tired face}
🎧	\twemoji{headphones}	🚽	\twemoji{toilet}
襚	\twemoji{headstone}	🗼	\twemoji{Tokyo tower}
👤	\twemoji{health worker}* 👤	👅	\twemoji{tongue}
HomeAs	\twemoji{hear-no-evil monkey}	💼	\twemoji{toolbox}
❤️	\twemoji{heart decoration}	🦷	\twemoji{tooth}
❤️	\twemoji{heart exclamation}	🦷	\twemoji{toothbrush}
❤️	\twemoji{heart with arrow}	🔝	\twemoji{TOP arrow}
❤️	\twemoji{heart with ribbon}	🎩	\twemoji{top hat}
\$	\twemoji{heavy dollar sign}	👤	\twemoji{trackball}
🌿	\twemoji{herb}	™	\twemoji{trade mark}
🌺	\twemoji{hibiscus}	🏳️	\twemoji{transgender symbol}

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⚡	\twemoji{high voltage}
👠	\twemoji{high-heeled shoe}
🥾	\twemoji{hiking boot}
⚠	\twemoji{hindu temple}
🕳	\twemoji{hole}
⭕	\twemoji{hollow red circle}
hook	\twemoji{hook}
🏇	\twemoji{horse racing}*
🏥	\twemoji{hospital}
🥵	\twemoji{hot face}
♨	\twemoji{hot springs}
🏨	\twemoji{hotel}
🏡	\twemoji{house}
🏡	\twemoji{house with garden}
🏘	\twemoji{houses}
🤗	\twemoji{hugging face}
💯	\twemoji{hundred points}
😯	\twemoji{hushed face}
🎪	\twemoji{hut}
🏒	\twemoji{ice hockey}
⛸	\twemoji{ice skate}
ID	\twemoji{ID button}
📥	\twemoji{inbox tray}
✉️	\twemoji{incoming envelope}
👉	\twemoji{index pointing up}*
♾	\twemoji{infinity}
ℹ	\twemoji{information}
🔤	\twemoji{input latin letters}
🔤	\twemoji{input latin lowercase}
🔤	\twemoji{input latin uppercase}
🔢	\twemoji{input numbers}
🔡	\twemoji{input symbols}
🎃	\twemoji{jack-o-lantern}
🉑	\twemoji{Japanese ‘‘acceptable’’ button}
🉑	\twemoji{Japanese ‘‘application’’ button}
🉐	\twemoji{Japanese ‘‘bargain’’ button}
㊗	\twemoji{Japanese ‘‘congratulations’’ button}
🈹	\twemoji{Japanese ‘‘discount’’ button}
🆓	\twemoji{Japanese ‘‘free of charge’’ button}
🈁	\twemoji{Japanese ‘‘here’’ button}
🚩	\twemoji{triangular flag}
📐	\twemoji{triangular ruler}
🔱	\twemoji{trident emblem}
🏆	\twemoji{trophy}
🎺	\twemoji{trumpet}
🌷	\twemoji{tulip}
❤️	\twemoji{two hearts}
☂️	\twemoji{umbrella}
⛱️	\twemoji{umbrella on ground}
☔	\twemoji{umbrella with rain drops}
ＺＺ	\twemoji{unamused face}
🔓	\twemoji{unlocked}
⬆️	\twemoji{up arrow}
🆙	\twemoji{UP! button}
⬇️	\twemoji{up-down arrow}
⬅️	\twemoji{up-left arrow}
➡️	\twemoji{up-right arrow}
🙃	\twemoji{upside-down face}
👆	\twemoji{upwards button}
🧝	\twemoji{vampire}*
📳	\twemoji{vibration mode}
✌️	\twemoji{victory hand}*
📹	\twemoji{video camera}
🎮	\twemoji{video game}
📼	\twemoji{videocassette}
🎻	\twemoji{violin}
♍	\twemoji{Virgo}
🌋	\twemoji{volcano}
🏑	\twemoji{volleyball}
🆚	\twemoji{VS button}
🖖	\twemoji{vulcan salute}*
⚠	\twemoji{warning}
🗑️	\twemoji{wastebasket}
⌚	\twemoji{watch}
🚾	\twemoji{water closet}
🔫	\twemoji{water pistol}
🌊	\twemoji{water wave}
👋	\twemoji{waving hand}*
〰	\twemoji{wavy dash}
😿	\twemoji{weary cat}

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月	\twemoji{Japanese “monthly amount” button}	😩	\twemoji{weary face}
満	\twemoji{Japanese “no vacancy” button}	👰	\twemoji{wedding}
有	\twemoji{Japanese “not free of charge” button}	☸	\twemoji{wheel of dharma}
🈳	\twemoji{Japanese “open for business” button}	♿	\twemoji{wheelchair symbol}
合	\twemoji{Japanese “passing grade” button}	拐	\twemoji{white cane}
禁	\twemoji{Japanese “prohibited” button}	⚪	\twemoji{white circle}
指	\twemoji{Japanese “reserved” button}	❗	\twemoji{white exclamation mark}
㊙️	\twemoji{Japanese “secret” button}	🏳️	\twemoji{white flag}
サ	\twemoji{Japanese “service charge” button}	💮	\twemoji{white flower}
空	\twemoji{Japanese “vacancy” button}	白	\twemoji{white hair}
🏯	\twemoji{Japanese castle}	❤️	\twemoji{white heart}
🎎	\twemoji{Japanese dolls}	◻	\twemoji{white large square}
🏣	\twemoji{Japanese post office}	◼	\twemoji{white medium square}
🔰	\twemoji{Japanese symbol for beginner}	◼	\twemoji{white medium-small square}
👖	\twemoji{jeans}	❓	\twemoji{white question mark}
🃏	\twemoji{joker}	▪	\twemoji{white small square}
🕹️	\twemoji{joystick}	▣	\twemoji{white square button}
👨‍⚖️	\twemoji{judge}* ＊	❀	\twemoji{wilted flower}
🕋	\twemoji{kaaba}	🎐	\twemoji{wind chime}
🔑	\twemoji{key}	חלון	\twemoji{window}
⌨️	\twemoji{keyboard}	😉	\twemoji{winking face}
ⓧ	\twemoji{keycap: 0}	😜	\twemoji{winking face with tongue}
ⓨ	\twemoji{keycap: 1}	👩	\twemoji{woman}* ＊
ⓩ	\twemoji{keycap: 2}	👩‍❤️‍👨	\twemoji{woman and man holding hands}* ＊
⓪	\twemoji{keycap: 3}	👩‍🎨	\twemoji{woman artist}* ＊
⓪	\twemoji{keycap: 4}	👩‍🚀	\twemoji{woman astronaut}* ＊
⓪	\twemoji{keycap: 5}	⛹️	\twemoji{woman bouncing ball}* ＊
⓪	\twemoji{keycap: 6}	-Originator	\twemoji{woman bowing}* ＊
⓪	\twemoji{keycap: 7}	🤸	\twemoji{woman cartwheeling}* ＊
⓪	\twemoji{keycap: 8}	🧗	\twemoji{woman climbing}* ＊
⓪	\twemoji{keycap: 9}	👷	\twemoji{woman construction worker}* ＊
⓪	\twemoji{keycap: 10}	饪	\twemoji{woman cook}* ＊
*	\twemoji{keycap: *}	💃	\twemoji{woman dancing}* ＊
#	\twemoji{keycap: #}	🕵️	\twemoji{woman detective}* ＊

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👘 \twemoji{kimono}	🧙 \twemoji{woman elf}* 💋 \twemoji{kiss}* 😺 \twemoji{kissing cat} 😘 \twemoji{kissing face} 😘 \twemoji{kissing face with closed eyes} 😍 \twemoji{kissing face with smiling eyes} 🔪 \twemoji{kitchen knife} 🪁 \twemoji{kite} 😵 \twemoji{knocked-out face} 🧈 \twemoji{knot} 白衣 \twemoji{lab coat} 🏷 \twemoji{label} 🏉 \twemoji{lacrosse} BDSM \twemoji{ladder} ◆ \twemoji{large blue diamond} ◆ \twemoji{large orange diamond} ⏮ \twemoji{last track button} ✝ \twemoji{latin cross}	👩 \twemoji{woman elf}* 🧙 \twemoji{woman facepalming}* 🏭 \twemoji{woman factory worker}* 🧚 \twemoji{woman fairy}* 🌾 \twemoji{woman farmer}* 🤱 \twemoji{woman feeding baby}* 🚒 \twemoji{woman firefighter}* 🙍 \twemoji{woman frowning}* 🧞 \twemoji{woman genie} 🚫 \twemoji{woman gesturing NO}* 🆗 \twemoji{woman gesturing OK}* 💇 \twemoji{woman getting haircut}* 💆 \twemoji{woman getting massage}* 🏌 \twemoji{woman golfing}* 💂 \twemoji{woman guard}* ⛑ \twemoji{woman health worker}* 🧘 \twemoji{woman in lotus position}* ♿ \twemoji{woman in manual wheelchair}* 🦢 \twemoji{woman in motorized wheelchair}* 🧖 \twemoji{woman in steamy room}* 🕴 \twemoji{woman in tuxedo}* ⚖ \twemoji{woman judge}* 🤹 \twemoji{woman juggling}* 꿇 \twemoji{woman kneeling}* 🏋 \twemoji{woman lifting weights}* 🧙 \twemoji{woman mage}* 🔧 \twemoji{woman mechanic}* 💼 \twemoji{woman office worker}* ✈ \twemoji{woman pilot}* 🤾 \twemoji{woman playing handball}* 🤽 \twemoji{woman playing water polo}* 👮 \twemoji{woman police officer}* 👄 \twemoji{woman pouting}* 🙋 \twemoji{woman raising hand}* 🏃 \twemoji{woman running}* 🔬 \twemoji{woman scientist}* 🤷 \twemoji{woman shrugging}* 🎤 \twemoji{woman singer}* 🕴 \twemoji{woman standing}* 🎓 \twemoji{woman student}* 🦸 \twemoji{woman superhero}* 危害 \twemoji{woman supervillain}* 📢 \twemoji{loudspeaker}
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	\twemoji{love hotel}		\twemoji{woman surfing}* *
	\twemoji{love letter}		\twemoji{woman swimming}* *
	\twemoji{love-you gesture}* *		\twemoji{woman teacher}* *
	\twemoji{luggage}		\twemoji{woman technologist}* *
	\twemoji{lungs}		\twemoji{woman tipping hand}* *
	\twemoji{lying face}		\twemoji{woman vampire}* *
	\twemoji{mage}* *		\twemoji{woman walking}* *
	\twemoji{magic wand}		\twemoji{woman wearing turban}* *
	\twemoji{magnet}		\twemoji{woman with headscarf}* *
	\twemoji{magnifying glass tilted left}		\twemoji{woman with veil}* *
	\twemoji{magnifying glass tilted right}		\twemoji{woman with white cane}* *
	\twemoji{mahjong red dragon}		\twemoji{woman zombie} *
	\twemoji{male sign}		\twemoji{woman's boot} *
	\twemoji{man}* *		\twemoji{woman's clothes} *
	\twemoji{man artist}* *		\twemoji{woman's hat} *
	\twemoji{man astronaut}* *		\twemoji{woman's sandal} *
	\twemoji{man bouncing ball}* *		\twemoji{women holding hands}* *
	\twemoji{man bowing}* *		\twemoji{women with bunny ears} *
	\twemoji{man cartwheeling}* *		\twemoji{women wrestling} *
	\twemoji{man climbing}* *		\twemoji{women's room} *
	\twemoji{man construction worker}* *		\twemoji{wood} *
	\twemoji{man cook}* *		\twemoji{woozy face} *
	\twemoji{man dancing}* *		\twemoji{world map} *
	\twemoji{man detective}* *		\twemoji{worried face} *
	\twemoji{man elf}* *		\twemoji{wrapped gift} *
	\twemoji{man facepalming}* *		\twemoji{wrench} *
	\twemoji{man factory worker}* *		\twemoji{writing hand}* *
	\twemoji{man fairy}* *		\twemoji{yarn} *
	\twemoji{man farmer}* *		\twemoji{yawning face} *
	\twemoji{man feeding baby}* *		\twemoji{yellow circle} *
	\twemoji{man firefighter}* *		\twemoji{yellow heart} *
	\twemoji{man frowning}* *		\twemoji{yellow square} *
	\twemoji{man genie}		\twemoji{yen banknote} *
	\twemoji{man gesturing NO}* *		\twemoji{yin yang} *
	\twemoji{man gesturing OK}* *		\twemoji{yo-yo} *
	\twemoji{man getting haircut}* *		\twemoji{zany face} *
	\twemoji{man getting massage}* *		\twemoji{zipper-mouth face} *
	\twemoji{man golfing}* *		\twemoji{zombie} *
	\twemoji{man guard}* *		\twemoji{zzz} *
	\twemoji{man health worker}* *		

Most twemojis symbols have multiple names. Only the most descriptive name for each symbol is shown in this table.

All twemojis symbols are implemented as PDF graphics, not with a font. See also the `hwemoji` package, which enables direct Unicode entry of emoji characters in pdfL<sup>A</sup>T<sub>E</sub>X; the `emoji` package, which provides a L<sup>A</sup>T<sub>E</sub>X interface to different underlying emoji fonts; and the `emo` package, which uses a font if possible, otherwise PDF graphics .

\* Variants of this symbol portraying different colors and styles are not shown. For example, `twemojis` defines the following variants of “thumbs up”:



See the `twemojis` documentation for more information.

TABLE 633: fontawesome5 Faces

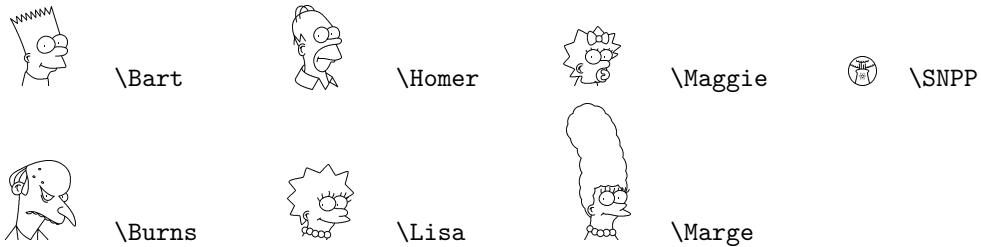
(;‑)	\faAngry	;)‑)	\faGrinWink
(;‑)	\faAngry[regular]	;)‑)	\faGrinWink[regular]
;)‑)	\faDizzy	;)‑)	\faKiss
;)‑)	\faDizzy[regular]	;)‑)	\faKiss[regular]
;)‑)	\faFlushed	;)‑)	\faKissBeam
;)‑)	\faFlushed[regular]	;)‑)	\faKissBeam[regular]
;)‑)	\faFrown	;)‑)	\faKissWinkHeart
;)‑)	\faFrown[regular]	;)‑)	\faKissWinkHeart[regular]
;)‑)	\faFrownOpen	;)‑)	\faLaugh
;)‑)	\faFrownOpen[regular]	;)‑)	\faLaugh[regular]
;)‑)	\faGrimace	;)‑)	\faLaughBeam
;)‑)	\faGrimace[regular]	;)‑)	\faLaughBeam[regular]
;)‑)	\faGrin*[regular]	;)‑)	\faLaughSquint
;)‑)	\faGrin*	;)‑)	\faLaughSquint[regular]
;)‑)	\faGrin	;)‑)	\faLaughWink
;)‑)	\faGrin[regular]	;)‑)	\faLaughWink[regular]
;)‑)	\faGrinBeam	;)‑)	\faMeh
;)‑)	\faGrinBeam[regular]	;)‑)	\faMeh[regular]
;)‑)	\faGrinBeamSweat	;)‑)	\faMehBlank
;)‑)	\faGrinBeamSweat[regular]	;)‑)	\faMehBlank[regular]

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☺	\faGrinHearts	☺	\faMehRollingEyes
☺	\faGrinHearts[regular]	☺	\faMehRollingEyes[regular]
☺	\faGrinSquint	☺	\faSadCry
☺	\faGrinSquint[regular]	☺	\faSadCry[regular]
☺	\faGrinSquintTears	☺	\faSadTear
☺	\faGrinSquintTears[regular]	☺	\faSadTear[regular]
☺	\faGrinStars	☺	\faSmile
☺	\faGrinStars[regular]	☺	\faSmile[regular]
☺	\faGrinTears	☺	\faSmileBeam
☺	\faGrinTears[regular]	☺	\faSmileBeam[regular]
☺	\faGrinTongue	☺	\faSmileWink
☺	\faGrinTongue[regular]	☺	\faSmileWink[regular]
☺	\faGrinTongueSquint	☺	\faSurprise
☺	\faGrinTongueSquint[regular]	☺	\faSurprise[regular]
☺	\faGrinTongueWink	☺	\faTired
☺	\faGrinTongueWink[regular]	☺	\faTired[regular]

TABLE 634: `simpsons` Characters from *The Simpsons*



The location of the characters' pupils can be controlled with the \Goofy command. See *A METAFONT of 'Simpsons' characters* [Che98] for more information. Also, each of the above can be prefixed with \Left to make the character face left instead of right:

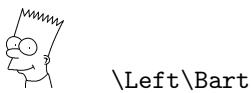


TABLE 635: `asapsym` People

⌚	\asapCycling	⌚	\asapMaleAtDrinkingFountain
👤	\asapFemaleAdult	👤	\asapMaleAtHelpDesk
🚶	\asapFemaleAtDrinkingFountain	🚶	\asapMaleChild
👨‍💻	\asapFemaleAtHelpDesk	👨‍💻	\asapMaleDiscardingTrash
👶	\asapFemaleChild	👶	\asapMaleHoldingInfant
🚮	\asapFemaleDiscardingTrash	🚮	\asapMaleWalking
🚼	\asapFemaleHoldingInfant	🚼	\asapMaleWalkingDog
🚶	\asapFemaleWalking	🚶	\asapMaleWalkingStroller
🐕	\asapFemaleWalkingDog	🐕	\asapMaleWithChild
🚼	\asapFemaleWalkingStroller	🚼	\asapMaleWithLuggageWaiting
👶	\asapFemaleWithChild	👶	\asapMaleWithLuggageWaving
🧳	\asapFemaleWithLuggageWaiting	🧳	\asapMaleWithServiceAnimal
🧳	\asapFemaleWithLuggageWaving	🧳	\asapPregnant
🐕	\asapFemaleWithServiceAnimal	🐕	\asapWaitingSeated
👥	\asapGroupMeeting	👤	\asapWalkingCane
👶	\asapInfant	♿	\asapWheelchairStationary
👤	\asapMaleAdult		

`asapsym` requires either `LuaLATEX` or `XHLATEX`.

TABLE 636: `utfsym` People and Faces

👤	\usym{1F464}	👤	\usym{1F46C}	👤	\usym{1F474}	👤	\usym{1F47E}
👤	\usym{1F465}	👤	\usym{1F46D}	👤	\usym{1F475}	👤	\usym{1F47F}
💀	\usym{1F466}	💀	\usym{1F46E}	💀	\usym{1F476}	💀	\usym{1F480}
💀	\usym{1F467}	💀	\usym{1F46F}	💀	\usym{1F477}	💀	\usym{1F481}
💀	\usym{1F468}	💀	\usym{1F470}	💀	\usym{1F478}	💀	\usym{1F482}
💀	\usym{1F469}	💀	\usym{1F471}	💀	\usym{1F479}	👤	\usym{1F483}
👤	\usym{1F46A}	👤	\usym{1F472}	👤	\usym{1F47A}	👤	\usym{1F486}
👤	\usym{1F46B}	👤	\usym{1F473}	👤	\usym{1F47D}	девушк	\usym{1F487}

All `utfsym` symbols are implemented with TikZ graphics, not with a font. In addition to `\usym`, the `utfsym` package defines `\usymH`, which renders a symbol at a given height, and `\usymW`, which renders a symbol at a given width. For example, “`\usymH{1F475}{36pt}`” produces



See the `utfsym` documentation for more information.

TABLE 637: *sillypage* Silly Walks

	\sillystep{1}		\sillystep{5}		\sillystep{9}
	\sillystep{2}		\sillystep{6}		\sillystep{10}
	\sillystep{3}		\sillystep{7}		\sillystep{11}
	\sillystep{4}		\sillystep{8}		\sillystep{12}

All *sillypage* symbols are implemented with PDF graphics, not with a font.

TABLE 638: *typicons* Users

	\tiUser		\tiUserAddOutline		\tiUserDeleteOutline
	\tiUserAdd		\tiUserDelete		\tiUserOutline

*typicons* requires either  $\text{Lua}\text{\texttt{L}}\text{\texttt{A}}\text{\texttt{T}}\text{\texttt{E}}\text{\texttt{X}}$  or  $\text{Xe}\text{\texttt{L}}\text{\texttt{A}}\text{\texttt{T}}\text{\texttt{E}}\text{\texttt{X}}$ .

TABLE 639: *fontawesome5* Users

	\faUser*		\faUserEdit		\faUsers
	\faUser		\faUserFriends		\faUsersCog
	\faUser[regular]		\faUserGraduate		\faUserSecret
	\faUserAltSlash		\faUserInjured		\faUserShield
	\faUserAstronaut		\faUserLock		\faUserSlash
	\faUserCheck		\faUserMd		\faUsersSlash
	\faUserCircle		\faUserMinus		\faUserTag
	\faUserCircle[regular]		\faUserNinja		\faUserTie
	\faUserClock		\faUserNurse		\faUserTimes
	\faUserCog		\faUserPlus		

TABLE 640: `scsnowman` Snowmen

```
\scsnowman
```

\* `\scsnowman` is drawn using TikZ. The command accepts a number of options for controlling the presence, appearance, and color of the snowman's body, eyes, nose, mouth, arms, hat, and more. See the `scsnowman` documentation for more information, but the following examples showcase a subset of the possibilities (drawn large for clarity):

	
<code>\scsnowman</code>	<code>\scsnowman[eyes, mouth, nose, arms, hat, muffler, buttons, snow, broom]</code>

TABLE 641: `typicons` Files and Folders

 \tiDocument	 \tiDocumentText	 \tiFolderDelete
 \tiDocumentAdd	 \tiFolder	 \tiFolderOpen
 \tiDocumentDelete	 \tiFolderAdd	

`typicons` requires either `LuaATEX` or `XGATEX`.

TABLE 642: `fontawesome5` Files and Folders

 \faFile*	 \faFileExport	 \faFileUpload
 \faFile	 \faFileImage	 \faFileVideo
 \faFile[regular]	 \faFileImage[regular]	 \faFileVideo[regular]
 \faFileArchive	 \faFileImport	 \faFileWord
 \faFileArchive[regular]	 \faFileInvoice	 \faFileWord[regular]
 \faFileAudio	 \faFileInvoiceDollar	 \faFolder
 \faFileAudio[regular]	 \faFileMedical*	 \faFolder[regular]
 \faFileCode	 \faFileMedical	 \faFolderMinus
 \faFileCode[regular]	 \faFilePdf	 \faFolderOpen
 \faFileContract	 \faFilePdf[regular]	 \faFolderOpen[regular]
 \faFileCsv	 \faFilePowerpoint	 \faFolderPlus
 \faFileDownload	 \faFilePowerpoint[regular]	
 \faFileExcel	 \faFilePrescription	

TABLE 643: fontawesome5 Religion

☥	\faAnkh	🕋	\faKaaba	ﷻ	\faQuran
☀️	\faBahai	👳	\faKhanda	☪️	\faStarAndCrescent
✝	\faBible	🕰️	\faMenorah	✡️	\faStarOfDavid
⛪	\faChurch	🕌	\faMosque	🕚	\faSynagogue
✝	\faCross	ॐ	\faOm	🕚	\faTorah
☸️	\faDharmachakra	🏃	\faPastafarianism	⛩️	\faToriiGate
ଆ	\faGopuram	🛐	\faPlaceOfWorship	🏯	\faVihara
✋	\faHamsa	🙏	\faPray	☯️	\faYinYang
🕰️	\faHanukiah	dua hands icon	\faPrayingHands		

TABLE 644: utfsym Religion

⌚ \usym{1F543} ⚡ \usym{1F545} 🕒 \usym{1F54B} 🚧 \usym{1F54D}  
⌚ \usym{1F544} ☰ \usym{1F549} 🚨 \usym{1F54C} ☹ \usym{1F54E}

All `utfsym` symbols are implemented with TikZ graphics, not with a font. In addition to `\usym`, the `utfsym` package defines `\usymH`, which renders a symbol at a given height, and `\usymW`, which renders a symbol at a given width. For example, “`\usymH{1f54b}{36pt}`” produces



See the `utfsym` documentation for more information.

TABLE 645: asapsym Elevators, Escalators, and Stairs

 \asapElevator       \asapEscalatorUp     \asapStairUp  
 \asapEscalator       \asapStair  
 \asapEscalatorDown    \asapStairDown

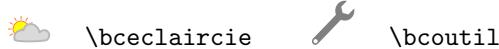
`asapsym` requires either `LuaLATEX` or `XELATEX`.

TABLE 646: Miscellaneous **bclogo** Symbols

	\bcattention		\bcetoile		\bcpanchant
	\bcbombe		\bcfemme		\bcpeaceandlove
	\bcbook		\bcfeujaune		\bcpluie
	\bccalendrier		\bcfeurouge		\bcplume
	\bccle		\bcfeutricolore		\bcpoisson
	\bcclefa		\bcfeuvert		\bcquestion
	\bcclesol		\bcfleur		\bcrecyclage
	\bccoeur		\bchomme		\bcrosevents
	\bccrayon		\bchorloge		\bcsmbh
	\bccube		\bcicosaedre		\bcsmmh
	\bcdallemande		\bcinfo		\bcsoleil
	\bcdanger		\bcinterdit		\bcspadesuit
	\bcdautriche		\bclampe		\bcstop
	\bcdbelgique		\bccloupe		\bctakecare
	\bcdbulgarie		\bcneige		\bctetraedre
	\bcdfrance		\bcnote		\bctrefle
	\bcditalie		\bcnucleaire		\bctrombone
	\bcdluxembourg		\bcocetaedre		\bcvaletcoeur
	\bcdodecaedre		\bcoeil		\bcvelo
	\bcdpaysbas		\bcorne		\bcyin
	\bcdz		\bcours		

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All `bclogo` symbols are implemented with TikZ (or alternatively, PSTricks) graphics, not with a font. This is how the symbols shown above can include color.

TABLE 647: Miscellaneous `utfsym` Symbols

❶	\usym{1F300}	❷	\usym{1F3EF}	❸	\usym{1F4E3}	❹	\usym{1F583}
❷	\usym{1F301}	❸	\usym{1F3F0}	❹	\usym{1F4E4}	❺	\usym{1F584}
❹	\usym{1F302}	❻	\usym{1F3F1}	❻	\usym{1F4E5}	❻	\usym{1F585}
❻	\usym{1F303}	❼	\usym{1F3F2}	❼	\usym{1F4E6}	❼	\usym{1F586}
❼	\usym{1F304}	❼	\usym{1F3F3}	❼	\usym{1F4E7}	❼	\usym{1F587}
❼	\usym{1F305}	❼	\usym{1F3F4}	❼	\usym{1F4E8}	❼	\usym{1F588}
❼	\usym{1F306}	❼	\usym{1F3F7}	❼	\usym{1F4E9}	❼	\usym{1F5A5}
❼	\usym{1F307}	❼	\usym{1F3FA}	❼	\usym{1F4EA}	❼	\usym{1F5A6}
❼	\usym{1F308}	❼	\usym{1F3FB}	❼	\usym{1F4EB}	❼	\usym{1F5A7}
❼	\usym{1F309}	❼	\usym{1F3FC}	❼	\usym{1F4EC}	❼	\usym{1F5A8}
❼	\usym{1F30A}	❼	\usym{1F3FD}	❼	\usym{1F4ED}	❼	\usym{1F5A9}
❼	\usym{1F30B}	❼	\usym{1F3FE}	❼	\usym{1F4EE}	❼	\usym{1F5AA}
❼	\usym{1F30C}	❼	\usym{1F3FF}	❼	\usym{1F4EF}	❼	\usym{1F5AB}
❼	\usym{1F30D}	❼	\usym{1F43D}	❼	\usym{1F4F0}	❼	\usym{1F5AC}
❼	\usym{1F30E}	❼	\usym{1F43E}	❼	\usym{1F4F1}	❼	\usym{1F5AD}
❼	\usym{1F30F}	❼	\usym{1F440}	❼	\usym{1F4F2}	❼	\usym{1F5AE}
❼	\usym{1F310}	❼	\usym{1F441}	❼	\usym{1F4F3}	❼	\usym{1F5AF}
❼	\usym{1F330}	❼	\usym{1F442}	❼	\usym{1F4F4}	❼	\usym{1F5B0}
❼	\usym{1F358}	❼	\usym{1F443}	❼	\usym{1F4F5}	❼	\usym{1F5B1}
❼	\usym{1F359}	❼	\usym{1F444}	❼	\usym{1F4F6}	❼	\usym{1F5B2}
❼	\usym{1F380}	❼	\usym{1F445}	❼	\usym{1F4F7}	❼	\usym{1F5B3}
❼	\usym{1F381}	❼	\usym{1F463}	❼	\usym{1F4F8}	❼	\usym{1F5B5}
❼	\usym{1F383}	❼	\usym{1F47B}	❼	\usym{1F4F9}	❼	\usym{1F5B6}
❼	\usym{1F384}	❼	\usym{1F47C}	❼	\usym{1F4FA}	❼	\usym{1F5B7}
❼	\usym{1F385}	❼	\usym{1F484}	❼	\usym{1F4FB}	❼	\usym{1F5B8}
❼	\usym{1F386}	❼	\usym{1F485}	❼	\usym{1F4FC}	❼	\usym{1F5B9}
❼	\usym{1F387}	❼	\usym{1F488}	❼	\usym{1F4FD}	❼	\usym{1F5BA}
❼	\usym{1F388}	❼	\usym{1F489}	❼	\usym{1F4FE}	❼	\usym{1F5BB}
❼	\usym{1F389}	❼	\usym{1F48A}	❼	\usym{1F4FF}	❼	\usym{1F5BC}
❼	\usym{1F38A}	❼	\usym{1F4AO}	❼	\usym{1F50B}	❼	\usym{1F5BD}
❼	\usym{1F38B}	❼	\usym{1F4A1}	❼	\usym{1F50C}	❼	\usym{1F5BE}
❼	\usym{1F38C}	❼	\usym{1F4A2}	❼	\usym{1F50D}	❼	\usym{1F5BF}
❼	\usym{1F38D}	❼	\usym{1F4A3}	❼	\usym{1F50E}	❼	\usym{1F5C0}

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_ACL	\usym{1F38E}	ZZZ	\usym{1F4A4}	ݔ	\usym{1F50F}	ݔ	\usym{1F5C1}
ݔ	\usym{1F38F}	ݔ	\usym{1F4A5}	ݔ	\usym{1F510}	ݔ	\usym{1F5C2}
ݔ	\usym{1F390}	ݔ	\usym{1F4A6}	ݔ	\usym{1F511}	ݔ	\usym{1F5C3}
ݔ	\usym{1F391}	ݔ	\usym{1F4A7}	ݔ	\usym{1F512}	ݔ	\usym{1F5C4}
ݔ	\usym{1F392}	ݔ	\usym{1F4A8}	ݔ	\usym{1F513}	ݔ	\usym{1F5C5}
ݔ	\usym{1F393}	ݔ	\usym{1F4A9}	ݔ	\usym{1F514}	ݔ	\usym{1F5C6}
ݔ	\usym{1F395}	ݔ	\usym{1F4AA}	ݔ	\usym{1F515}	ݔ	\usym{1F5C7}
ݔ	\usym{1F396}	ݔ	\usym{1F4AB}	ݔ	\usym{1F516}	ݔ	\usym{1F5C8}
ݔ	\usym{1F397}	ݔ	\usym{1F4AC}	ݔ	\usym{1F517}	ݔ	\usym{1F5C9}
ݔ	\usym{1F398}	ݔ	\usym{1F4AD}	ݔ	\usym{1F518}	ݔ	\usym{1F5CA}
ݔ	\usym{1F399}	ݔ	\usym{1F4AE}	ݔ	\usym{1F519}	ݔ	\usym{1F5CB}
ݔ	\usym{1F39A}	ݔ	\usym{1F4AF}	ݔ	\usym{1F51A}	ݔ	\usym{1F5CC}
ݔ	\usym{1F39B}	ݔ	\usym{1F4B0}	ݔ	\usym{1F51B}	ݔ	\usym{1F5CD}
ݔ	\usym{1F39E}	ݔ	\usym{1F4B1}	ݔ	\usym{1F51C}	ݔ	\usym{1F5CE}
ݔ	\usym{1F39F}	ݔ	\usym{1F4B2}	ݔ	\usym{1F51D}	ݔ	\usym{1F5CF}
ݔ	\usym{1F3A0}	ݔ	\usym{1F4B3}	ݔ	\usym{1F51E}	ݔ	\usym{1F5D0}
ݔ	\usym{1F3A1}	ݔ	\usym{1F4B4}	ݔ	\usym{1F51F}	ݔ	\usym{1F5D1}
ݔ	\usym{1F3A2}	ݔ	\usym{1F4B5}	ݔ	\usym{1F520}	ݔ	\usym{1F5D2}
ݔ	\usym{1F3A3}	ݔ	\usym{1F4B6}	ݔ	\usym{1F521}	ݔ	\usym{1F5D3}
ݔ	\usym{1F3A4}	ݔ	\usym{1F4B7}	ݔ	\usym{1F522}	ݔ	\usym{1F5D4}
ݔ	\usym{1F3A5}	ݔ	\usym{1F4B8}	ݔ	\usym{1F523}	ݔ	\usym{1F5D6}
ݔ	\usym{1F3A6}	ݔ	\usym{1F4B9}	ݔ	\usym{1F524}	ݔ	\usym{1F5D7}
ݔ	\usym{1F3A7}	ݔ	\usym{1F4BA}	ݔ	\usym{1F525}	ݔ	\usym{1F5D8}
ݔ	\usym{1F3A8}	ݔ	\usym{1F4BB}	ݔ	\usym{1F526}	ݔ	\usym{1F5D9}
ݔ	\usym{1F3A9}	ݔ	\usym{1F4BC}	ݔ	\usym{1F527}	ݔ	\usym{1F5DA}
ݔ	\usym{1F3AA}	ݔ	\usym{1F4BD}	ݔ	\usym{1F528}	ݔ	\usym{1F5DB}
ݔ	\usym{1F3AB}	ݔ	\usym{1F4BE}	ݔ	\usym{1F529}	ݔ	\usym{1F5DC}
ݔ	\usym{1F3AC}	ݔ	\usym{1F4BF}	ݔ	\usym{1F52A}	ݔ	\usym{1F5DD}
ݔ	\usym{1F3AD}	ݔ	\usym{1F4C0}	ݔ	\usym{1F52B}	ݔ	\usym{1F5DE}
ݔ	\usym{1F3B4}	ݔ	\usym{1F4C1}	ݔ	\usym{1F52C}	ݔ	\usym{1F5DF}
ݔ	\usym{1F3B7}	ݔ	\usym{1F4C2}	ݔ	\usym{1F52D}	ݔ	\usym{1F5E0}
ݔ	\usym{1F3B8}	ݔ	\usym{1F4C3}	ݔ	\usym{1F52E}	ݔ	\usym{1F5E1}
ݔ	\usym{1F3B9}	ݔ	\usym{1F4C4}	ݔ	\usym{1F530}	ݔ	\usym{1F5E2}
ݔ	\usym{1F3BA}	ݔ	\usym{1F4C5}	ݔ	\usym{1F531}	ݔ	\usym{1F5E3}
ݔ	\usym{1F3BB}	ݔ	\usym{1F4C6}	ݔ	\usym{1F532}	ݔ	\usym{1F5E4}
ݔ	\usym{1F3BD}	ݔ	\usym{1F4C7}	ݔ	\usym{1F533}	ݔ	\usym{1F5E5}
ݔ	\usym{1F3D4}	ݔ	\usym{1F4C8}	ݔ	\usym{1F53E}	ݔ	\usym{1F5E6}
ݔ	\usym{1F3D5}	ݔ	\usym{1F4C9}	ݔ	\usym{1F53F}	ݔ	\usym{1F5E7}
ݔ	\usym{1F3D6}	ݔ	\usym{1F4CA}	ݔ	\usym{1F540}	ݔ	\usym{1F5E8}
ݔ	\usym{1F3D7}	ݔ	\usym{1F4CB}	ݔ	\usym{1F541}	ݔ	\usym{1F5E9}
ݔ	\usym{1F3D8}	ݔ	\usym{1F4CC}	ݔ	\usym{1F542}	ݔ	\usym{1F5EA}
ݔ	\usym{1F3D9}	ݔ	\usym{1F4CD}	ݔ	\usym{1F54F}	ݔ	\usym{1F5EB}
ݔ	\usym{1F3DA}	ݔ	\usym{1F4CE}	ݔ	\usym{1F56B}	ݔ	\usym{1F5EC}
ݔ	\usym{1F3DB}	ݔ	\usym{1F4CF}	ݔ	\usym{1F56C}	ݔ	\usym{1F5ED}
ݔ	\usym{1F3DC}	ݔ	\usym{1F4D0}	ݔ	\usym{1F56D}	ݔ	\usym{1F5EE}
ݔ	\usym{1F3DD}	ݔ	\usym{1F4D1}	ݔ	\usym{1F56E}	ݔ	\usym{1F5EF}

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⌚	\usym{1F3DE}	⌚	\usym{1F4D2}	⌚	\usym{1F56F}	⌚	\usym{1F5F0}
⌚	\usym{1F3DF}	⌚	\usym{1F4D3}	⌚	\usym{1F571}	⌚	\usym{1F5F1}
⌚	\usym{1F3E0}	⌚	\usym{1F4D4}	⌚	\usym{1F572}	⌚	\usym{1F5F2}
⌚	\usym{1F3E1}	⌚	\usym{1F4D5}	⌚	\usym{1F574}	⌚	\usym{1F5F3}
⌚	\usym{1F3E2}	⌚	\usym{1F4D6}	⌚	\usym{1F575}	⌚	\usym{1F5FA}
⌚	\usym{1F3E3}	⌚	\usym{1F4D7}	⌚	\usym{1F577}	⌚	\usym{1F5FB}
⌚	\usym{1F3E4}	⌚	\usym{1F4D8}	⌚	\usym{1F578}	⌚	\usym{1F5FC}
⌚	\usym{1F3E5}	⌚	\usym{1F4D9}	⌚	\usym{1F579}	⌚	\usym{1F5FD}
⌚	\usym{1F3E6}	⌚	\usym{1F4DA}	⌚	\usym{1F57A}	⌚	\usym{1F5FE}
⌚	\usym{1F3E7}	⌚	\usym{1F4DB}	⌚	\usym{1F57B}	⌚	\usym{1F5FF}
⌚	\usym{1F3E8}	⌚	\usym{1F4DC}	⌚	\usym{1F57C}	⌚	\usym{1F573}
⌚	\usym{1F3E9}	⌚	\usym{1F4DD}	⌚	\usym{1F57D}	⌚	\usym{1F576}
⌚	\usym{1F3EA}	⌚	\usym{1F4DE}	⌚	\usym{1F57E}	⌚	\usym{1F5B4}
⌚	\usym{1F3EB}	⌚	\usym{1F4DF}	⌚	\usym{1F57F}	⌚	\usym{1F5D5}
⌚	\usym{1F3EC}	⌚	\usym{1F4EO}	⌚	\usym{1F580}		
⌚	\usym{1F3ED}	⌚	\usym{1F4E1}	⌚	\usym{1F581}		
⌚	\usym{1F3EE}	⌚	\usym{1F4E2}	⌚	\usym{1F582}		

All `utfsym` symbols are implemented with TikZ graphics, not with a font. In addition to `\usym`, the `utfsym` package defines `\usymH`, which renders a symbol at a given height, and `\usymW`, which renders a symbol at a given width. See the `utfsym` documentation for more information.

TABLE 648: typicons Brand Icons

❖	\tiDropbox	✉	\tiSocialLinkedinCircular
◎	\tiSocialAtCircular	Pinterest	\tiSocialPinterest
⊗	\tiSocialDribbble	Pinterest Circular	\tiSocialPinterestCircular
◎	\tiSocialDribbbleCircular	Skype	\tiSocialSkype
f	\tiSocialFacebook	Skype Outline	\tiSocialSkypeOutline
⌚	\tiSocialFacebookCircular	Tumbler	\tiSocialTumbler
⌚	\tiSocialFlickr	Tumbler Circular	\tiSocialTumblerCircular
⌚	\tiSocialFlickrCircular	Twitter	\tiSocialTwitter
⌚	\tiSocialGithub	Twitter Circular	\tiSocialTwitterCircular
⌚	\tiSocialGithubCircular	Vimeo	\tiSocialVimeo
⌚	\tiSocialGooglePlus	Vimeo Circular	\tiSocialVimeoCircular
⌚	\tiSocialGooglePlusCircular	Youtube	\tiSocialYoutube
⌚	\tiSocialInstagram	Youtube Circular	\tiSocialYoutubeCircular
⌚	\tiSocialInstagramCircular	Android	\tiVendorAndroid
⌚	\tiSocialLastFm	Apple	\tiVendorApple
⌚	\tiSocialLastFmCircular	Microsoft	\tiVendorMicrosoft
in	\tiSocialLinkedin		

typicons requires either `LuaATEX` or `XCATEX`.

TABLE 649: fontawesome5 Brand Icons

⚡	\faAccessibleIcon	git	\faGit	raspberryPi
⚠	\faAccusoft	github	\faGithub*	\faRavelry
⚠	\faAcquisitionsIncorporated	github	\faGithub	\faReact
⚠	\faAdn	github	\faGithubSquare	\faReacteurope
ad	\faAdversal	gitkraken	\faGitkraken	\faReadme
⚠	\faAffiliatetheme	gitlab	\faGitlab	\faRebel
⚠	\faAirbnb	git	\faGitSquare	\faReddit
⚠	\faAlgolia	gitter	\faGitter	\faRedditAlien
⚠	\faAlipay	glide	\faGlide	\faRedditSquare
a	\faAmazon	glideg	\faGlideG	\faRedhat
pay	\faAmazonPay	gofore	\faGofore	\faRedRiver
a	\faAmilia	goodreads	\faGoodreads	\faRenren
⚠	\faAndroid	goodreadsg	\faGoodreadsG	\faReplyd
⚠	\faAngellist	google	\faGoogle	\faResearchgate
⚠	\faAngrycreative	googledrive	\faGoogleDrive	\faRev
A	\faAngular	googlepay	\faGooglePay	\faRocketchat
upper	\faApper	googleplay	\faGooglePlay	\faRockrms
⚠	\faApple	googleplus	\faGooglePlus	\faRProject
apple	\faApplePay	googleplusg	\faGooglePlusG	\faRust
⚠	\faAppStore	googleplussquare	\faGooglePlusSquare	\faSafari
A	\faAppStoreIos	googlewallet	\faGoogleWallet	\faSalesforce
⚠	\faArtstation	gratipay	\faGratipay	\faSass
⚠	\faAsymmetrik	grav	\faGrav	\faSchlix
⚠	\faAtlassian	gripfire	\faGripfire	\faScribd
⚠	\faAudible	grunt	\faGrunt	\faSearchengin
A-	\faAutoprefixer	gilded	\faGilded	\faSellcast
⚠	\faAvianex	gulp	\faGulp	\faSellsy
avianto	\faAviato	hackernews	\faHackerNews	\faServicestack
aws	\faAws	hackernewsquare	\faHackerNewsSquare	\faShirtsinbulk
⚠	\faBandcamp	hackerrank	\faHackerrank	\faShopify
⚠	\faBattleNet	hips	\faHips	\faShopware
Bē	\faBehance	hireahelper	\faHireAHelper	\faSimplybuilt
be	\faBehanceSquare	hive	\faHive	\faSistrix
⚠	\faBimobject	hooli	\faHooli	\faSith
⚠	\faBitbucket	hornbill	\faHornbill	\faSketch
฿	\faBitcoin	hotjar	\faHotjar	\faSkyatlas
⌚	\faBity	houzz	\faHouzz	\faSkype
⠇	\faBlackberry	html5	\faHtml5	\faSlack
⚠	\faBlackTie	hubspot	\faHubspot	\faSlackHash
⚠	\faBlogger	icon500px	\faIcon{500px}	\faSlideshare
⚠	\faBloggerB	ideal	\faIdeal	\faSnapchat
⚠	\faBluetooth	imdb	\faImdb	\faSnapchatGhost
⌘	\faBluetothB	innosoft	\faInnosoft	

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	\faBootstrap		\faInstagram		\faSnapchatSquare
	\faBuffer		\faInstagramSquare		\faSoundcloud
	\faBuromobelexperte		\faInstalod		\faSourcetree
	\faBuyNLarge		\faIntercom		\faSpeakap
	\faBuysellads		\faInternetExplorer		\faSpeakerDeck
	\faCanadianMapleLeaf		\faInvision		\faSpotify
	\faCcAmazonPay		\faIoXhost		\faSquarespace
	\faCcAmex		\faItchIo		\faStackExchange
	\faCcApplePay		\faiTunes		\faStackOverflow
	\faCcDinersClub		\faiTunesNote		\faStackpath
	\faCcDiscover		\faJava		\faStaylinked
	\faCcJcb		\faJedi		\faSteam
	\faCcMastercard		\faJediOrder		\faSteamSquare
	\faCcPaypal		\faJenkins		\faSteamSymbol
	\faCcStripe		\faJira		\faStickerMule
	\faCcVisa		\faJoget		\faStrava
	\faCentercode		\faJoomla		\faStripe
	\faCentos		\faJs		\faStripeS
	\faChrome		\faJsfiddle		\faStumbleupon
	\faChromecast		\faJsSquare		\faStumbleuponCircle
	\faCloudflare		\faKaggle		\faSuperpowers
	\faCloudscale		\faKeybase		\faSupple
	\faCloudsmith		\faKeycdn		\faSuse
	\faCloudversify		\faKickstarter		\faSwift
	\faCodepen		\faKickstarterK		\faSymfony
	\faCodiepie		\faKorvue		\faTeamspeak
	\faConfluence		\faLaravel		\faTelegram
	\faConnectdevelop		\faLastfm		\faTelegramPlane
	\faContao		\faLastfmSquare		\faTencentWeibo
	\faCottonBureau		\faLeanpub		\faThemeco
	\faCpanel		\faLess		\faTheRedYeti
	\faCriticalRole		\faLine		\faThinkPeaks
	\faCss3		\faLinkedin		\faTiktok
	\faCuttlefish		\faLinkedinIn		\faTradeFederation
	\faDailymotion		\faLinode		\faTrello
	\faDAndD		\faLinux		\faTumblr
	\faDAndDBeyond		\faLyft		\faTumblrSquare
	\faDashcube		\faMagento		\faTwitch
	\faDeezer		\faMailchimp		\faTwitter
	\faDelicious		\faMandalorian		\faTwitterSquare
	\faDeploydog		\faMarkdown		\faTypo3
	\faDeskpro		\faMastodon		\faUber
	\faDev		\faMaxcdn		\faUbuntu
	\faDeviantart		\faMdb		
	\faDhl		\faMedapps		

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★	\faDiaspora	M	\faMedium	ဂ	\faUikit
digg	\faDigg	M	\faMediumM	ဂ	\faUmbraco
⌚	\faDigitalOcean	⌚	\faMedrt	⌚	\faUncharted
discord	\faDiscord	⌚	\faMeetup	⌚	\faUniregistry
D	\faDiscourse	Ⓜ	\faMegaport	⌚	\faUnity
D	\faDochub	Ⓜ	\faMendeley	⌚	\faUnsplash
docker	\faDocker	⭐	\faMicroblog	ups	\faUntappd
draft2digital	\faDraft2digital	⭐	\faMicrosoft	usb	\faUsb
dropbox	\faDropbox	⭐	\faMix	✉	\faUsps
drupal	\faDrupal	⭐	\faMixcloud	☪	\faUssunnah
D	\faDyalog	✖	\faMixer	▼	\faVaadin
earlybirds	\faEarlybirds	Ⓜ	\faMizuni	₩	\faViacoin
ebay	\faEbay	Ⓜ	\faModx	⌚	\faViadeo
edge	\faEdge	Ⓜ	\faMonero	⌚	\faViadeoSquare
edgeLegacy	\faEdgeLegacy	Ⓜ	\faNapster	⌚	\faViber
elementor	\faElementor	N	\faNeos	⌚	\faVimeo
ello	\faEllo	Ⓜ	\faNimblr	⌚	\faVimeoSquare
ember	\faEmber	node	\faNode	⌚	\faVimeoV
empire	\faEmpire	JS	\faNodeJs	⌚	\faVine
envira	\faEnvira	npm	\faNpm	⌚	\faVk
Erlang	\faErlang	ns8	\faNs8	vw	\faVnv
Ethereum	\faEthereum	tv	\faNutritionix	▼	\faVuejs
Etsy	\faEtsy	🐙	\faOctopusDeploy	⌚	\faWatchmanMonitoring
evernote	\faEvernote	ओ	\faOdnoklassniki	⌚	\faWaze
expeditedssl	\faExpeditedssl	ଓ	\faOdnoklassnikiSquare	⌚	\faWeebly
facebook	\faFacebook	ଓ	\faOldRepublic	⌚	\faWeibo
facebookF	\faFacebookF	..	\faOpenCart	⌚	\faWeixin
facebookMessenger	\faFacebookMessenger	openid	\faOpenid	⌚	\faWhatsapp
facebookSquare	\faFacebookSquare	O	\faOpera	⌚	\faWhatsappSquare
fantasyFlightGames	\faFantasyFlightGames	ঠ	\faOptinMonster	⌚	\faWhmcs
FedEx	\faFedex	b	\faOrcid	⌚	\faWikipediaW
FedEx	\faFedex	ଓ	\faOsi	⌚	\faWindows
FedEx	\faFedex	প	\faPage4	⌚	\faWix
FedEx	\faFedex	ঔ	\faPagelines	⌚	\faWizardsOfTheCoast
FedEx	\faFedex	P	\faPalfed	Wodu	\faWodu
FedEx	\faFedex	●	\faPatreon	🐺	\faWolfPackBattalion
FedEx	\faFedex	P	\faPaypal	wordpress	\faWordpress
FedEx	\faFedex	¤	\faPennyArcade	wordpress	\faWordpressSimple
FedEx	\faFedex	¤	\faPerbyte	wpbeginner	\faWpbeginner
FedEx	\faFedex	ଓ	\faPeriscope	wpxplorer	\faWpxplorer
FedEx	\faFedex	ଓ	\faPhabricator	wpforms	\faWPForms
FedEx	\faFedex	ଓ	\faPhoenixFramework	wpressr	\faWpressr
FedEx	\faFedex	ଓ	\faPhoenixSquadron	xbox	\faXbox
FedEx	\faFedex	ଓ	\faPhp	xing	\faXing
FedEx	\faFedex	ଓ	\faPiedPiper*		

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	\faFonticonsFi		\faPiedPiper		\faXingSquare
	\faFontAwesome*		\faPiedPiperHat		\faYahoo
	\faFontAwesome		\faPiedPiperPp		\faYammer
	\faForumbee		\faPiedPiperSquare		\faYandex
	\faFoursquare		\faPinterest		\faYandexInternational
	\faFreebsd		\faPinterestP		\faYarn
	\faFreeCodeCamp		\faPinterestSquare		\faYCombinator
	\faFulcrum		\faPlaystation		\faYelp
	\faGalacticRepublic		\faProductHunt		\faYoast
	\faGalacticSenate		\faPushed		\faYoutube
	\faGetPocket		\faPython		\faYoutubeSquare
	\faGg		\faQuinscape		\faZhihu
	\faGgCircle		\faQuora		
	\faGit*				

TABLE 650: fontmfizz Brand Icons

	\mfAlpinelinux		\mfGoogle		\mfNpm
	\mfAngular		\mfGoogleAlt		\mfObjc
	\mfAngularAlt		\mfGoogleCode		\mfOpenshift
	\mfApache		\mfGoogleDevelopers		\mfOracle
	\mfArchlinux		\mfGradle		\mfOracleAlt
	\mfAws		\mfGrails		\mfOsx
	\mfAzure		\mfGrailsAlt		\mfPerl
	\mfBackbone		\mfGrunt		\mfPhp
	\mfBlackberry		\mfGulp		\mfPhpAlt
	\mfBootstrap		\mfGulpAlt		\mfPlayframework
	\mfC		\mfHadoop		\mfPlayframeworkAlt
	\mfCassandra		\mfHaskell		\mfPlone
	\mfCentos		\mfHeroku		\mfPostgres
	\mfClojure		\mfHtml		\mfPostgresAlt
	\mfCodeigniter		\mfHtmlfive		\mfPython
	\mfCodepen		\mfHtmlfiveAlt		\mfRaspberrypi
	\mfCoffeeBean		\mfJava		\mfReactjs
	\mfCplusplus		\mfJavaBold		\mfRedhat
	\mfCsharp		\mfJavaDuke		\mfRedis
	\mfCss		\mfJavascript		\mfRuby

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	\mfCssthree		\mfJavascriptAlt		\mfRubyOnRails
	\mfCssthreeAlt		\mfJetty		\mfRubyOnRailsAlt
	\mfDebian		\mfJquery		\mfRust
	\mfDocker		\mfKde		\mfSass
	\mfDreamhost		\mfLaravel		\mfSatellite
	\mfDthree		\mfLinuxMint		\mfScala
	\mfElixir		\mfLooking		\mfScalaAlt
	\mfElm		\mfMagento		\mfSitefinity
	\mfErlang		\mfMariadb		\mfSolaris
	\mfExherbo		\mfMaven		\mfSpring
	\mfFedora		\mfMongodb		\mfSuse
	\mfFireAlt		\mfMssql		\mfSvg
	\mfFreebsd		\mfMysql		\mfSymfony
	\mfFreeecodecamp		\mfMysqlAlt		\mfThreedprint
	\mfGentoo		\mfNetbsd		\mfTomcat
	\mfGit		\mfNginx		\mfUbuntu
	\mfGnome		\mfNginxAlt		\mfUnity
	\mfGo		\mfNginxAlttwo		\mfWordpress
	\mfGoAlt		\mfNodejs		\mfXeleven

fontmfizz requires either Lua<sup>L</sup>A<sub>T</sub>E<sub>X</sub> or X<sub>H</sub>L<sup>A</sup>T<sub>E</sub>X.

TABLE 651: fontawesome5 Medical Symbols

	\faAllergies		\faFirstAid		\faPills
	\faAmbulance		\faHeadSideCough		\faPrescription
	\faBacteria		\faHeadSideCoughSlash		\faPrescriptionBottle*
	\faBacterium		\faHeadSideMask		\faPrescriptionBottle
	\faBandAid		\faHeadSideVirus		\faProcedures
	\faBiohazard		\faHeartbeat		\faPumpMedical
	\faBookMedical		\faHospital*		\faShieldVirus
	\faBrain		\faHospital		\faStethoscope
	\faBriefcaseMedical		\faHospital[regular]		\faSyringe
	\faCapsules		\faHospitalSymbol		\faTablets
	\faClinicMedical		\faHospitalUser		\faVirus
	\faCommentMedical		\faLaptopMedical		\faViruses
	\faCrutch		\faLungs		\faVirusSlash
	\faDiagnoses		\faLungsVirus		\faXRay
	\faDisease		\faMedkit		
	\faDna		\faNotesMedical		

TABLE 652: fontawesome5 Disability Symbols

	\faAmericanSignLanguageInterpreting		\faLowVision
	\faAssistiveListeningSystems		\faSignLanguage
	\faBlind		\faTty
	\faBraille		\faWheelchair
	\faDeaf		

TABLE 653: asapsym Transportation Symbols

	\asapAirplaneLanding		\asapBoat
	\asapAirplaneOverhead		\asapBus
	\asapAirplaneTakeoff		\asapHelicopter
	\asapAutomobile		\asapTaxi
	\asapAutomobileWithKey		\asapTrain
	\asapBicycle		

asapsym requires either  $\text{Lua}\text{\LaTeX}$  or  $\text{Xe}\text{\LaTeX}$ .

TABLE 654: twemojis Transportation Emoji

	\twemoji{mountain railway}
	\twemoji{aerial tramway}
	\twemoji{airplane}
	\twemoji{airplane arrival}
	\twemoji{airplane departure}
	\twemoji{ambulance}
	\twemoji{articulated lorry}
	\twemoji{auto rickshaw}
	\twemoji{automobile}
	\twemoji{baggage claim}
	\twemoji{bicycle}
	\twemoji{bullet train}
	\twemoji{bus}
	\twemoji{bus stop}
	\twemoji{canoe}
	\twemoji{construction}
	\twemoji{customs}
	\twemoji{delivery truck}
	\twemoji{fire engine}
	\twemoji{mountain biking}* \twemoji{person biking}* \twemoji{person mountain biking}* \twemoji{person rowing boat}* \twemoji{pickup truck}
	\twemoji{no bicycles}
	\twemoji{oncoming automobile}
	\twemoji{oncoming bus}
	\twemoji{oncoming police car}
	\twemoji{oncoming taxi}
	\twemoji{passenger ship}
	\twemoji{passport control}
	\twemoji{police car light}
	\twemoji{police car}
	\twemoji{racing car}
	\twemoji{railway car}
	\twemoji{railway track}
	\twemoji{rocket}
	\twemoji{roller skate}

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	\twemoji{flying saucer}		\twemoji{ship}
	\twemoji{helicopter}		\twemoji{skateboard}
	\twemoji{high-speed train}		\twemoji{sled}
	\twemoji{horizontal traffic light}		\twemoji{small airplane}
	\twemoji{kick scooter}		\twemoji{speedboat}
	\twemoji{left luggage}		\twemoji{sport utility vehicle}
	\twemoji{light rail}		\twemoji{station}
	\twemoji{locomotive}		\twemoji{suspension railway}
	\twemoji{man biking}*		\twemoji{taxi}
	\twemoji{man mountain biking}*		\twemoji{tractor}
	\twemoji{man rowing boat}*		\twemoji{train2}
	\twemoji{metro}		\twemoji{tram}
	\twemoji{minibus}		\twemoji{tram car}
	\twemoji{monorail}		\twemoji{trolleybus}
	\twemoji{motor boat}		\twemoji{vertical traffic light}
	\twemoji{motor scooter}		\twemoji{woman biking}*
	\twemoji{motorcycle}		\twemoji{woman mountain biking}*
	\twemoji{motorway}		\twemoji{woman rowing boat}*
	\twemoji{mountain cableway}		

Most `twemoji` symbols have multiple names. Only the most descriptive name for each symbol is shown in this table.

All `twemoji` symbols are implemented as PDF graphics, not with a font. See also the `hwemoji` package, which enables direct Unicode entry of emoji characters in pdfL<sup>A</sup>T<sub>E</sub>X; the `emoji` package, which provides a L<sup>A</sup>T<sub>E</sub>X interface to different underlying emoji fonts; and the `emo` package, which uses a font if possible, otherwise PDF graphics .

\* Variants of this symbol portraying different colors and styles are not shown. An example is presented after Table 632 on page 290. See the `twemoji` documentation for more information.

TABLE 655: `asapsym` Everyday Objects

	\asapBook		\asapHanger		\asapMug
	\asapCigarette		\asapMicroscope		\asapPhone
	\asapEnvelope		\asapMobilePhone		\asapTablet
	\asapGift		\asapMonitor		\asapUtensils

`asapsym` requires either L<sup>A</sup>T<sub>E</sub>X or X<sub>L</sub><sup>A</sup>T<sub>E</sub>X.

TABLE 656: typicons Everyday Objects

⚓ \tiAnchor	🎥 \tiFilm	❖ \tiPinOutline
⌚ \tiAnchorOutline	🚩 \tiFlag	₩ \tiPiOutline
🔗 \tiAttachment	🏳 \tiFlagOutline	pipette \tiPipette
📎 \tiAttachmentOutline	🎁 \tiGift	✈ \tiPlane
🧪 \tiBeaker	🌐 \tiGlobe	✈ \tiPlaneOutline
🍺 \tiBeer	🌍 \tiGlobeOutline	🔌 \tiPlug
🔔 \tiBell	🎧 \tiHeadphones	🖨 \tiPrinter
📘 \tiBook	🏡 \tiHome	✳ \tiPuzzle
💼 \tiBriefcase	🏠 \tiHomeOutline	✳ \tiPuzzleOutline
🖌 \tiBrush	🔑 \tiKey	✂ \tiScissors
כרטיס \tiBusinessCard	⌨ \tiKeyboard	✂ \tiScissorsOutline
-Calculator \tiCalculator	⌚ \tiKeyOutline	🛍 \tiShoppingBag
📷 \tiCamera	🌿 \tiLeaf	🛒 \tiShoppingCart
📷 \tiCameraOutline	💡 \tiLightbulb	🔧 \tiSpanner
📋 \tiClipboard	🔒 \tiLockClosed	🔧 \tiSpannerOutline
☕ \tiCoffee	🔓 \tiLockClosedOutline	🏷 \tiTag
🧭 \tiCompass	🔓 \tiLockOpen	🏷 \tiTags
📱 \tiContacts	🔓 \tiLockOpenOutline	🎫 \tiTicket
💳 \tiCreditCard	✉ \tiMail	🗑 \tiTrash
💻 \tiDeviceDesktop	gMaps \tiMap	🌳 \tiTree
💻 \tiDeviceLaptop	🎙 \tiMicrophone	🎥 \tiVideo
📱 \tiDevicePhone	📞 \tiMicrophoneOutline	🎥 \tiVideoOutline
tablet \tiDeviceTablet	-mortarBoard \tiMortarBoard	🍷 \tiWine
🧭 \tiDirections	📰 \tiNews	🌐 \tiWorld
👁 \tiEye	📱 \tiPhone	🌐 \tiWorldOutline
👁 \tiEyeOutline	📲 \tiPhoneOutline	
羽毛 \tiFeather	📌 \tiPin	

typicons requires either  $\text{Lua}\text{\LaTeX}$  or  $\text{Xe}\text{\LaTeX}$ .

TABLE 657: fontawesome5 Everyday Objects

	\faAirFreshener		\faGlassMartini		\faRocket
	\faAnchor		\faGlassWhiskey		\faRuler
	\faApple*		\faGraduationCap		\faRulerCombined
	\faArchive		\faGuitar		\faRulerHorizontal
	\faArchway		\faHamburger		\faRulerVertical
	\faAward		\faHammer		\faSatellite
	\faBaby		\faHardHat		\faSatelliteDish
	\faBabyCarriage		\faHatCowboy		\faSchool
	\faBacon		\faHatCowboySide		\faScrewdriver
	\faBath		\faHatWizard		\faScroll
	\faBed		\faHdd		\faSdCard
	\faBeer		\faHdd[regular]		\faSeedling
	\faBell		\faHeadphones*		\faShield*
	\faBell[regular]		\faHeadphones		\faShip
	\faBicycle		\faHeadset		\faShoePrints
	\faBinoculars		\faHelicopter		\faShoppingBag
	\faBirthdayCake		\faHome		\faShoppingBasket
	\faBlender		\faHotdog		\faShoppingCart
	\faBlenderPhone		\faHotel		\faShower
	\faBomb		\faHotTub		\faShuttleVan
	\faBone		\faIceCream		\faSign
	\faBong		\faIgloo		\faSimCard
	\faBox		\faJoint		\faSink
	\faBoxes		\faKey		\faSleigh
	\faBoxOpen		\faKeyboard		\faSmoking
	\faBoxTissue		\faKeyboard[regular]		\faSnowman
	\faBreadSlice		\faLandmark		\faSnowplow
	\faBriefcase		\faLaptop		\faSoap
	\faBroom		\faLeaf		\faSocks
	\faBrush		\faLemon		\faSolarPanel
	\faBuilding		\faLemon[regular]		\faSpaceShuttle
	\faBuilding[regular]		\faLifeRing		\faSprayCan
	\faBullhorn		\faLifeRing[regular]		\faStamp
	\faBus*		\faLightbulb		\faStickyNote
	\faBus		\faLightbulb[regular]		\faStickyNote[regular]
	\faCalculator		\faLock		\faStore
	\faCamera		\faLockOpen		\faStore
	\faCameraRetro		\faLuggageCart		\faStroopwafel
	\faCandyCane		\faMagnet		\faSubway
	\faCannabis		\faMale		\faSuitcase
	\faCar*		\faMap		\faSuitcaseRolling
	\faCar		\faMap[regular]		\faSwatchbook

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	\faCaravan		\faMask		\faSwimmingPool
	\faCarBattery		\faMedal		\faTablet*
	\faCarrot		\faMemory		\faTablet
	\faCarSide		\faMeteor		\faTag
	\faCashRegister		\faMicrochip		\faTags
	\faChair		\faMicrophone*		\faTape
	\faChalkboard		\faMicrophone		\faTaxi
	\faCheese		\faMicroscope		\faTeeth
	\faChild		\faMitten		\faTeethOpen
	\faCity		\faMobile*		\faTheaterMasks
	\faCocktail		\faMobile		\faThermometer
	\faCoffee		\faMoneyBill*[regular]		\faThumbtack
	\faCoins		\faMoneyBill*		\faTicket*
	\faCompactDisc		\faMoneyBill		\faToilet
	\faCompass		\faMoneyBillWave*		\faToiletPaper
	\faCompass[regular]		\faMoneyBillWave		\faToolbox
	\faConciergeBell		\faMoneyCheck*		\faTools
	\faCookie		\faMoneyCheck		\faTooth
	\faCookieBite		\faMonument		\faTractor
	\faCouch		\faMoon		\faTrafficLight
	\faCreditCard		\faMoon[regular]		\faTrailer
	\faCreditCard[regular]		\faMortarPestle		\faTrain
	\faCrown		\faMotorcycle		\faTram
	\faDolly		\faMountain		\faTrash*[regular]
	\faDollyFlatbed		\faMouse		\faTrash*
	\faDoorClosed		\faMugHot		\faTrash
	\faDoorOpen		\faNewspaper		\faTree
	\faDraftingCompass		\faNewspaper[regular]		\faTrophy
	\faDrum		\faOilCan		\faTruck
	\faDrumSteelpan		\faPager		\faTruckLoading
	\faDrumstickBite		\faPaintBrush		\faTruckMonster
	\faDumpster		\faPaintRoller		\faTruckMoving
	\faDungeon		\faPalette		\faTruckPickup
	\faEgg		\faPallet		\faTshirt
	\faEyeDropper		\faPaperclip		\faTv
	\faFan		\faPaperPlane		\faUmbrella
	\faFaucet		\faPaperPlane[regular]		\faUmbrellaBeach
	\faFax		\faParachuteBox		\faUniversity
	\faFeather*		\faPencilRuler		\faUnlock*
	\faFeather		\faPepperHot		\faUnlock
	\faFemale		\faPhone*		\faUtensils
	\faFighterJet		\faPhone		\faUtensilSpoon
	\faFireExtinguisher		\faPiggyBank		\faVest
	\faFlask		\faPizzaSlice		\faVestPatches

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	\faGamepad		\faPlane		\faVial
	\faGasPump		\faPlug		\faVials
	\faGavel		\faPumpSoap		\faVrCardboard
	\faGem		\faPuzzlePiece		\faWallet
	\faGem[regular]		\faRainbow		\faWarehouse
	\faGhost		\faReceipt		\faWeightHanging
	\faGift		\faRecordVinyl		\faWineBottle
	\faGifts		\faRibbon		\faWineGlass*
	\faGlassCheers		\faRing		\faWineGlass
	\faGlasses		\faRoad		\faWrench
	\faGlassMartini*		\faRobot		

TABLE 658: figchild Everyday Objects

	\fcAbajourA		\fcEar		\fcRazor
	\fcAbajourB		\fcExcavator		\fcRobe
	\fcAbajourC		\fcFaceTowel		\fcSandal
	\fcAbajourD		\fcFan		\fcSchoolbag
	\fcAlarmClockA		\fcFanA		\fcScissors
	\fcAlarmClockB		\fcFlashlight		\fcScooter
	\fcAppleTree		\fcFlower		\fcSeeds
	\fcBabe		\fcFlowerA		\fcSheet
	\fcBall		\fcFlowerB		\fcsheetA
	\fcBallA		\fcFlowerC		\fcsheetB
	\fcBallB		\fcFlowerD		\fcShip
	\fcBallC		\fcFlowerE		\fcShower

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	\fcBalloon		\fcFlowerF		\fcSleepingBag
	\fcBalloonsA		\fcFlowerG		\fcSnowflake
	\fcBalloonsB		\fcFlowerH		\fcSock
	\fcBarquet		\fcFlowerP		\fcSofaA
	\fcBaseballBat		\fcGlass		\fcSofaB
	\fcBed		\fcGloves		\fcSpray
	\fcBellA		\fcHand		\fcSteamroller
	\fcBike		\fcHat		\fcStoolA
	\fcBinoculars		\fcHatA		\fcStoolB
	\fcBoat		\fcHelicopter		\fcStoolC
	\fcBonnet		\fcHouse		\fcSubmarineA
	\fcBookA		\fcHouseA		\fcTableLight
	\fcBookB		\fcHouseB		\fcTelevision
	\fcBroom		\fcJuicy		\fcTent
	\fcBud		\fcKey		\fcThroat
	\fcBus		\fcKite		\fcToiletPaper
	\fcCactoerpuntia		\fcKiteA		\fcTornado
	\fcCactusA		\fcKnees		\fcTractorA
	\fcCactusB		\fcLamp		\fcTractorB
	\fcCandle		\fcLanguage		\fcTrain
	\fcCar		\fcLightBulb		\fcTree
	\fcCarA		\fcLightning		\fcTricycle
	\fcCart		\fcMailbox		\fcTruck

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	\fcCartA		\fcMailBoxA		\fcTruckA
	\fcCellPhone		\fcMat		\fcTruckB
	\fcChairA		\fcMeton		\fcTruckC
	\fcChairB		\fcMill		\fcTruckD
	\fcChairC		\fcMirror		\fcTruckE
	\fcChairD		\fcMonster		\fcTruckF
	\fcChristmasTree		\fcMotorcycle		\fcTruckG
	\fcChrysanthemum		\fcMotorcycleA		\fcTruckH
	\fcCoach		\fcNose		\fcTrunk
	\fcComb		\fcPalmTree		\fcTulip
	\fcComputer		\fcPencil		\fcUmbrella
	\fcCrane		\fcPencilA		\fcVan
	\fcCrownA		\fcPhone		\fcVase
	\fcCushion		\fcpink		\fcWagon
	\fcDaisy		\fcPlane		\fcWardrobe
	\fcDarts		\fcPlaneA		\fcWateringCan
	\fcData		\fcPumpkinA		\fcYoyo
	\fcDressingTable		\fcPyramid		
	\fcDryer		\fcRake		

TABLE 659: Miscellaneous `asapsym` Symbols

+	\asapCross	☒	\asapLocker
☒	\asapDog	☒	\asapLostAndFound

`asapsym` requires either `LuaATEX` or `XHATEX`.

TABLE 660: Miscellaneous typicons Symbols

ⓐ	\tiAt	♥	\tiHeartHalfOutline	⌘	\tiPointOfInterestOutline
⚡	\tiFlash	♡	\tiHeartOutline	⊛	\tiRadar
⚡	\tiFlashOutline	♫	\tiNotes	⊛	\tiRadarOutline
❤	\tiHeart	¤	\tiNotesOutline	⊛	\tiSpiral
❤	\tiHeartFullOutline	⌘	\tiPointOfInterest		

typicons requires either `LuaLaTeX` or `XeLaTeX`.

TABLE 661: Miscellaneous fontawesome5 Symbols

🌐	\faAtlas	🌐	\faGlobe	👤	\faPersonBooth
⚛	\faAtom	🌐	\faGlobeAfrica	📞	\faPhoneSlash
⚖	\faBalanceScale	🌐	\faGlobeAmericas	☎	\faPhoneSquare*
⚖	\faBalanceScaleLeft	🌐	\faGlobeAsia	📞	\faPhoneSquare
⚖	\faBalanceScaleRight	🌐	\faGlobeEurope	📞	\faPhoneVolume
🚫	\faBan	❤	\faHeart	✈	\faPlaneArrival
barcode	\faBarcode	❤	\faHeart [regular]	✈	\faPlaneDeparture
Bezier	\faBezierCurve	❤	\faHeartBroken	✈	\faPlaneSlash
⚡	\faBolt	🏃	\faHiking	💩	\faPoo
📖	\faBook	🏡	\faHollyBerry	💩	\faPoop
💀	\faBookDead	🏡	\faHouseDamage	⚡	\faPooStorm
📖	\faBookOpen	🏡	\faHouseUser	☢	\faRadiation*
👤	\faBookReader	㧑	\faHSquare	☢	\faRadiation
⚠	\faBroadcastTower	🆔	\faIdBadge	🗳	\faRepublican
🎯	\faBullseye	🆔	\faIdBadge [regular]	🚻	\faRestroom
💧	\faBurn	👤	\faIdCard*	🏃	\faRunning
🏕	\faCampground	👤	\faIdCard	🚚	\faShippingFast
🚗	\faCarCrash	👤	\faIdCard [regular]	💀	\faSkull
🌟	\faCertificate	⼯	\faIndustry	💀	\faSkullCrossbones
👨	\faChalkboardTeacher		\faJournalWhills	🚫	\faSmokingBan
🔌	\faChargingStation	💻	\faLaptopHouse	SPA	\faSpa
📋	\faClipboardList	⚡	\faMagic	*	\faSplotch
⚙	\faCogs	⚥	\faMapSigns	🚽	\faToiletPaperSlash
📦	\faCube	☿	\faMercury	🗳	\faVoteYea
📦	\faCubes	🅿	\faParking	🚶	\faWalking
DEMOCRAT	\faDemocrat	.Passport	\faPassport	⽔	\faWater
DIR	\faDirections	🐾	\faPaw	⚡	\faWaveSquare
🔥	\faDumpsterFire	☮	\faPeace	👤	\faWeight
🔥	\faFire	👫	\faPeopleArrows		
💰	\faFunnelDollar	👬	\faPeopleCarry		

TABLE 662: Miscellaneous fontmfizz Symbols

	\mfAntenna		\mfLineGraph		\mfPhoneRetro
	\mfBomb		\mfMicroscope		\mfScript
	\mfDatabase		\mfMobileDevice		\mfScriptAlt
	\mfDatabaseAlt		\mfMobilePhoneAlt		\mfShell
	\mfDatabaseAlttwo		\mfMobilePhoneBroadcast		\mfSplatter
	\mfGhost		\mfPhoneAlt		\mfWireless
	\mfIphone		\mfPhoneGap		

fontmfizz requires either `LuaLaTeX` or `XeLaTeX`.

TABLE 663: rubikcube Rubik's Cube Rotations

	\rrhD		\rrhF		\rrhLw		\rrhRw		\rrhU
	\rrhDa		\rrhFp		\rrhLwp		\rrhRwp		\rrhUa
	\rrhDap		\rrhFw		\rrhM		\rrhSd		\rrhUap
	\rrhDp		\rrhFwp		\rrhMp		\rrhSdp		\rrhUp
	\rrhDs		\rrhL		\rrhR		\rrhSl		\rrhUs
	\rrhDsp		\rrhLa		\rrhRa		\rrhSlp		\rrhUsp
	\rrhDw		\rrhLap		\rrhRap		\rrhSr		\rrhUw
	\rrhDwp		\rrhLp		\rrhRp		\rrhSrp		\rrhUwp
	\rrhE		\rrhLs		\rrhRs		\rrhSu		
	\rrhEp		\rrhLsp		\rrhRsp		\rrhSup		

All `rubikcube` symbols are implemented with TikZ graphics, not with a font. In addition to the symbols shown above, the `rubikcube` package defines commands for combinations of textual and graphical representations of rotations (e.g., `\textRubikUa` produces “**Ua** ”) as well as commands that produce colored illustrations of Rubik's Cube configurations and rotations. See the `rubikcube` documentation for more information.

TABLE 664: sacsymb Orchestrated Objective Reduction Symbols

	\ca		\cd		\cg		\cj		\cm		\cq		\cu
	\cb		\ce		\ch		\ck		\cn		\cs		\cv
	\cc		\cf		\ci		\cl		\co		\ct		\cw

All `sacsymb` symbols are implemented with TikZ graphics, not with a font.

TABLE 665: academicons Online Academic Profile Icons

A	\aiAcademia
A	\aiAcademiaSquare
↗	\aiAcclaim
↗	\aiAcclaimSquare
icon	\aiACM
DL	\aiACMDL
gear	\aiACMDLSquare
diagram	\aiACMSquare
globe	\aiADS
globe	\aiADSSquare
pen	\aiAfricArXiv
pen	\aiAfricArXivSquare
archive	\aiArchive
archive	\aiArchiveSquare
user	\aiarXiv
user	\aiarXivSquare
Rx	\aibioRxiv
Rx	\aibioRxivSquare
square	\aiCEUR
square	\aiCEURSquare
double arrow	\aciENCIAVITAE
double arrow	\aciENCIAVITAESquare
theta	\aiClosedAccess
theta	\aiClosedAccessSquare
O	\aiConversation
O	\aiConversationSquare
S	\aiCoursera
S	\aiCourseraSquare
wave	\aiCrossref
wave	\aiCrossrefSquare
CV	\aicV
CV	\aicVSquare
link	\aiDataCite
link	\aiDataCiteSquare
globe	\aiDataverse
globe	\aiDataverseSquare
aidblp	\aidblp
aidblp	\aidblpSquare
depsy	\aiDepsy
depsy	\aiDepsySquare
dot	\aiDoi
dot	\aiDoiSquare
tree	\aiDryad
circle	\aiFigshare
circle	\aiFigshareSquare
globe	\aiGoogleScholar
globe	\aiGoogleScholarSquare
halo	\aiHAL
halo	\aiHALSquare
hypothesis	\aiHypothesis
hypothesis	\aiHypothesisSquare
IDEAS	\aiIDEASRePEC
IDEAS	\aiIDEASRePECSquare
IEEE	\aiIEEE
IEEE	\aiIEEESquare
info	\aiImpactstory
info	\aiImpactstorySquare
twitter	\aiiNaturalist
twitter	\aiiNaturalistSquare
heart	\aiINPN
heart	\aiINPNSquare
spark	\aiInspire
spark	\aiInspireSquare
isidore	\aiISIDORE
isidore	\aiISIDORESquare
J	\aiJSTOR
J	\aiJSTORSquare
circle	\aiLattes
circle	\aiLattesSquare
math	\aiMathOverflow
math	\aiMathOverflowSquare
mendeley	\aiMendeley
mendeley	\aiMendeleySquare
moodle	\aiMoodle
moodle	\aiMoodleSquare
mtmt	\aiMTMT
mtmt	\aiMTMTSquare
nakala	\aiNAKALA
nakala	\aiNAKALASquare
book	\aiOBP
book	\aiOBPSquare
theta	\aiOpenAccess
theta	\aiOpenAccessSquare
bar chart	\aiOpenData
bar chart	\aiOpenDataSquare
leaf	\aiOpenEdition
id	\aiOrcid
id	\aiOrcidSquare
osf	\aiOSF
osf	\aiOSFSquare
overleaf	\aiOverleaf
overleaf	\aiOverleafSquare
philpapers	\aiPhilPapers
philpapers	\aiPhilPapersSquare
piazza	\aiPiazza
piazza	\aiPiazzaSquare
checkmark	\aiPreregistered
checkmark	\aiPreregisteredSquare
protocols	\aiProtocols
protocols	\aiProtocolsSquare
psyarxiv	\aiPsyArXiv
psyarxiv	\aiPsyArXivSquare
publons	\aiPublons
publons	\aiPublonsSquare
pubmed	\aiPubMed
pubmed	\aiPubMedSquare
pubpeer	\aiPubPeer
pubpeer	\aiPubPeerSquare
researcherid	\aiResearcherID
researcherid	\aiResearcherIDSquare
researchgate	\aiResearchGate
researchgate	\aiResearchGateSquare
ror	\aiROR
ror	\aiRORSquare
scihub	\aiSciHub
scihub	\aiSciHubSquare
scirate	\aiSciRate
scirate	\aiSciRateSquare
scopus	\aiScopus
scopus	\aiScopusSquare
semantic	\aiSemanticScholar
semantic	\aiSemanticScholarSquare
springer	\aiSpringer
springer	\aiSpringerSquare
ssrn	\aiSSRN
ssrn	\aiSSRNSquare
stackoverflow	\aiStackOverflow
stackoverflow	\aiStackOverflowSquare
zenodo	\aiZenodo

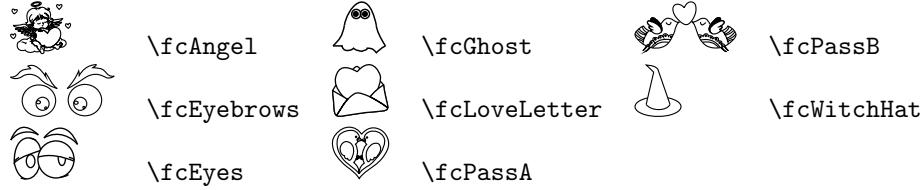
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	\aiDryadSquare		\aiOpenEditionSquare		\aiZenodoSquare
E	\aiElsevier		\aiOpenMaterials	Z	\aiZotero
	\aiElsevierSquare		\aiOpenMaterialsSquare		\aiZoteroSquare

academicicons requires either `LuaLaTeX` or `XeLaTeX`.

TABLE 666: Miscellaneous figchild Symbols



All `figchild` symbols are implemented with `TikZ` graphics, not with a font. Not shown above, each symbol takes three arguments: a scale factor, a line color, and a line thickness. See the `figchild` documentation for more information.

# Chapter 11

## Fonts with minimal L<sup>A</sup>T<sub>E</sub>X support

The symbol fonts shown in this chapter are provided without a corresponding L<sup>A</sup>T<sub>E</sub>X 2<sub>E</sub> style file that assigns a convenient name to each glyph. Consequently, each glyph must be accessed by number. To help with this, the `pifont` package defines a `\Pisymbol` command that typesets a specified character by number from a specified L<sup>A</sup>T<sub>E</sub>X font family. Alas, most of the fonts in this chapter do not even define a L<sup>A</sup>T<sub>E</sub>X font family. Hence, except where otherwise specified, a document will need to include code like the following in its preamble:

```
\usepackage{pifont}
\DeclareFontFamily{U}{<name>}{}
\DeclareFontShape{U}{<name>}[m][n]{<-> <font>}{}
```

where `<font>` is the name of the `.tfm` font file (or `.mf` font file, from which a `.tfm` font file can be generated automatically), and `<name>` is a name to use to refer to that font. It's generally good practice to use the name of the font file for `<name>`, as in the following:

```
\usepackage{pifont}
\DeclareFontFamily{U}{hands}{}
\DeclareFontShape{U}{hands}[m][n]{<-> hands}{}
```

TABLE 667: hands Fists

	<code>\Pisymbol{hands}{65}</code>		<code>\Pisymbol{hands}{67}</code>
	<code>\Pisymbol{hands}{66}</code>		<code>\Pisymbol{hands}{68}</code>

TABLE 668: greenpoint Recycling Symbols

`\Pisymbol{greenpoint}{71}`

TABLE 669: nkarta Map Symbols

○	\Pisymbol{nkarta}{33}	●	\Pisymbol{nkarta}{193}
△	\Pisymbol{nkarta}{34}	□	\Pisymbol{nkarta}{194}
◊	\Pisymbol{nkarta}{35}	■	\Pisymbol{nkarta}{195}
○	\Pisymbol{nkarta}{36}	○	\Pisymbol{nkarta}{196}
◆	\Pisymbol{nkarta}{37}	○	\Pisymbol{nkarta}{197}
○	\Pisymbol{nkarta}{38}	○	\Pisymbol{nkarta}{198}
○	\Pisymbol{nkarta}{39}	○	\Pisymbol{nkarta}{199}
○	\Pisymbol{nkarta}{40}	○	\Pisymbol{nkarta}{200}
○	\Pisymbol{nkarta}{41}	○	\Pisymbol{nkarta}{201}
★	\Pisymbol{nkarta}{42}	◆	\Pisymbol{nkarta}{202}
..	\Pisymbol{nkarta}{43}	■	\Pisymbol{nkarta}{203}
↶	\Pisymbol{nkarta}{44}	■	\Pisymbol{nkarta}{204}
↑	\Pisymbol{nkarta}{45}	○	\Pisymbol{nkarta}{205}
⤵	\Pisymbol{nkarta}{46}	○	\Pisymbol{nkarta}{206}
⦿	\Pisymbol{nkarta}{47}	○	\Pisymbol{nkarta}{207}
○	\Pisymbol{nkarta}{48}	○	\Pisymbol{nkarta}{208}
○	\Pisymbol{nkarta}{49}	○	\Pisymbol{nkarta}{209}
○	\Pisymbol{nkarta}{50}	○	\Pisymbol{nkarta}{210}
○	\Pisymbol{nkarta}{51}	←	\Pisymbol{nkarta}{211}
○	\Pisymbol{nkarta}{52}	←	\Pisymbol{nkarta}{212}
○	\Pisymbol{nkarta}{53}	↓	\Pisymbol{nkarta}{213}
○	\Pisymbol{nkarta}{54}	↑	\Pisymbol{nkarta}{214}
○	\Pisymbol{nkarta}{55}	←	\Pisymbol{nkarta}{215}
○	\Pisymbol{nkarta}{56}	●	\Pisymbol{nkarta}{216}
○	\Pisymbol{nkarta}{57}	●	\Pisymbol{nkarta}{217}
□	\Pisymbol{nkarta}{58}	●	\Pisymbol{nkarta}{218}
○	\Pisymbol{nkarta}{59}	●	\Pisymbol{nkarta}{219}
○	\Pisymbol{nkarta}{60}	○	\Pisymbol{nkarta}{220}
↑	\Pisymbol{nkarta}{61}	●	\Pisymbol{nkarta}{221}
⤵	\Pisymbol{nkarta}{62}	○	\Pisymbol{nkarta}{222}
⤵	\Pisymbol{nkarta}{63}	○	\Pisymbol{nkarta}{223}
□	\Pisymbol{nkarta}{64}	○	\Pisymbol{nkarta}{224}
○	\Pisymbol{nkarta}{65}	○	\Pisymbol{nkarta}{225}
○	\Pisymbol{nkarta}{66}	○	\Pisymbol{nkarta}{226}
●	\Pisymbol{nkarta}{67}	●	\Pisymbol{nkarta}{227}
▲	\Pisymbol{nkarta}{68}	●	\Pisymbol{nkarta}{228}
☆	\Pisymbol{nkarta}{69}	●	\Pisymbol{nkarta}{229}
●	\Pisymbol{nkarta}{70}	○	\Pisymbol{nkarta}{230}
⤵	\Pisymbol{nkarta}{71}	○	\Pisymbol{nkarta}{231}
⤵	\Pisymbol{nkarta}{72}	○	\Pisymbol{nkarta}{232}
⤵	\Pisymbol{nkarta}{73}	○	\Pisymbol{nkarta}{233}

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+	\Pisymbol{nkarta}{74}
)	\Pisymbol{nkarta}{75}
□	\Pisymbol{nkarta}{76}
■	\Pisymbol{nkarta}{77}
◆	\Pisymbol{nkarta}{78}
○	\Pisymbol{nkarta}{79}
▽	\Pisymbol{nkarta}{80}
▲	\Pisymbol{nkarta}{81}
★	\Pisymbol{nkarta}{82}
○	\Pisymbol{nkarta}{83}
◎	\Pisymbol{nkarta}{84}
⌚	\Pisymbol{nkarta}{85}
🔋	\Pisymbol{nkarta}{86}
🍁	\Pisymbol{nkarta}{87}
♿	\Pisymbol{nkarta}{88}
🦅	\Pisymbol{nkarta}{89}
⌚	\Pisymbol{nkarta}{90}
↑	\Pisymbol{nkarta}{91}
↗	\Pisymbol{nkarta}{92}
↙	\Pisymbol{nkarta}{93}
↖	\Pisymbol{nkarta}{94}
↘	\Pisymbol{nkarta}{95}
*	\Pisymbol{nkarta}{171}
□	\Pisymbol{nkarta}{172}
■	\Pisymbol{nkarta}{173}
◆	\Pisymbol{nkarta}{174}
○	\Pisymbol{nkarta}{175}
○	\Pisymbol{nkarta}{176}
▽	\Pisymbol{nkarta}{177}
▲	\Pisymbol{nkarta}{178}
★	\Pisymbol{nkarta}{179}
○	\Pisymbol{nkarta}{180}
◎	\Pisymbol{nkarta}{181}
⌚	\Pisymbol{nkarta}{182}
🔋	\Pisymbol{nkarta}{183}
🍁	\Pisymbol{nkarta}{184}
♿	\Pisymbol{nkarta}{185}
🦅	\Pisymbol{nkarta}{186}
⌚	\Pisymbol{nkarta}{187}
↑	\Pisymbol{nkarta}{188}
↗	\Pisymbol{nkarta}{189}
↙	\Pisymbol{nkarta}{190}
↖	\Pisymbol{nkarta}{191}
↘	\Pisymbol{nkarta}{192}
✖	\Pisymbol{nkarta}{235}
✖	\Pisymbol{nkarta}{236}
✖	\Pisymbol{nkarta}{237}
✖	\Pisymbol{nkarta}{238}
✖	\Pisymbol{nkarta}{239}
✖	\Pisymbol{nkarta}{240}
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✖	\Pisymbol{nkarta}{248}
✖	\Pisymbol{nkarta}{249}
✖	\Pisymbol{nkarta}{250}
✖	\Pisymbol{nkarta}{251}
✖	\Pisymbol{nkarta}{252}
▼	\Pisymbol{nkarta}{253}
▶	\Pisymbol{nkarta}{254}

TABLE 670: moonphase Astronomical Symbols

\Pisymbol{moonphase}{0} \Pisymbol{moonphase}{2}  
\Pisymbol{moonphase}{1} \Pisymbol{moonphase}{3}

TABLE 671: `astrosym` Astronomical Symbols

○	\Pisymbol{astrosym}{0}	□	\Pisymbol{astrosym}{132}
♀	\Pisymbol{astrosym}{1}	*	\Pisymbol{astrosym}{133}
♂	\Pisymbol{astrosym}{2}	♂	\Pisymbol{astrosym}{134}
☿	\Pisymbol{astrosym}{3}	↙	\Pisymbol{astrosym}{135}
♁	\Pisymbol{astrosym}{4}	♀	\Pisymbol{astrosym}{136}
♂	\Pisymbol{astrosym}{5}	♂	\Pisymbol{astrosym}{137}
♃	\Pisymbol{astrosym}{6}	□	\Pisymbol{astrosym}{138}
♄	\Pisymbol{astrosym}{7}	○	\Pisymbol{astrosym}{139}
♅	\Pisymbol{astrosym}{8}	●	\Pisymbol{astrosym}{140}
♆	\Pisymbol{astrosym}{9}	○	\Pisymbol{astrosym}{141}
♇	\Pisymbol{astrosym}{10}	○	\Pisymbol{astrosym}{142}
♈	\Pisymbol{astrosym}{11}	○	\Pisymbol{astrosym}{143}
♉	\Pisymbol{astrosym}{12}	○	\Pisymbol{astrosym}{144}
♊	\Pisymbol{astrosym}{13}	○	\Pisymbol{astrosym}{145}
♋	\Pisymbol{astrosym}{14}	○	\Pisymbol{astrosym}{146}
♌	\Pisymbol{astrosym}{15}	○	\Pisymbol{astrosym}{147}
♍	\Pisymbol{astrosym}{16}	○	\Pisymbol{astrosym}{148}
♎	\Pisymbol{astrosym}{17}	○	\Pisymbol{astrosym}{149}
♏	\Pisymbol{astrosym}{18}	*	\Pisymbol{astrosym}{150}
♐	\Pisymbol{astrosym}{19}	*	\Pisymbol{astrosym}{151}
♑	\Pisymbol{astrosym}{20}	△	\Pisymbol{astrosym}{152}
♒	\Pisymbol{astrosym}{21}	□	\Pisymbol{astrosym}{153}
♓	\Pisymbol{astrosym}{22}	✖	\Pisymbol{astrosym}{154}
♔	\Pisymbol{astrosym}{23}	○	\Pisymbol{astrosym}{155}
♕	\Pisymbol{astrosym}{24}	○	\Pisymbol{astrosym}{156}
♖	\Pisymbol{astrosym}{25}	○	\Pisymbol{astrosym}{157}
♗	\Pisymbol{astrosym}{26}	▽	\Pisymbol{astrosym}{158}
♘	\Pisymbol{astrosym}{27}	◀	\Pisymbol{astrosym}{159}
♙	\Pisymbol{astrosym}{28}	*	\Pisymbol{astrosym}{160}
♚	\Pisymbol{astrosym}{29}	△	\Pisymbol{astrosym}{161}
♛	\Pisymbol{astrosym}{30}	□	\Pisymbol{astrosym}{162}
♜	\Pisymbol{astrosym}{31}	△	\Pisymbol{astrosym}{163}
♝	\Pisymbol{astrosym}{32}	○	\Pisymbol{astrosym}{164}

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*	\Pisymbol{astrosym}{33}	⌚	\Pisymbol{astrosym}{165}
⚡	\Pisymbol{astrosym}{34}	⌚	\Pisymbol{astrosym}{166}
↖	\Pisymbol{astrosym}{35}	⌚	\Pisymbol{astrosym}{167}
⚲	\Pisymbol{astrosym}{36}	⌚	\Pisymbol{astrosym}{168}
⚲	\Pisymbol{astrosym}{37}	*	\Pisymbol{astrosym}{169}
□	\Pisymbol{astrosym}{38}	⌚	\Pisymbol{astrosym}{178}
○	\Pisymbol{astrosym}{39}	⌚	\Pisymbol{astrosym}{179}
●	\Pisymbol{astrosym}{40}	⌚	\Pisymbol{astrosym}{180}
☽	\Pisymbol{astrosym}{41}	⌚	\Pisymbol{astrosym}{181}
☾	\Pisymbol{astrosym}{42}	*	\Pisymbol{astrosym}{182}
☽	\Pisymbol{astrosym}{43}	△	\Pisymbol{astrosym}{183}
☽	\Pisymbol{astrosym}{44}	□	\Pisymbol{astrosym}{184}
☽	\Pisymbol{astrosym}{45}	×	\Pisymbol{astrosym}{185}
☽	\Pisymbol{astrosym}{46}	⌚	\Pisymbol{astrosym}{186}
☽	\Pisymbol{astrosym}{47}	⌚	\Pisymbol{astrosym}{187}
⌚	\Pisymbol{astrosym}{48}	⌚	\Pisymbol{astrosym}{188}
⌚	\Pisymbol{astrosym}{49}	⌚	\Pisymbol{astrosym}{189}
*	\Pisymbol{astrosym}{50}	⌚	\Pisymbol{astrosym}{190}
*	\Pisymbol{astrosym}{51}	*	\Pisymbol{astrosym}{191}
▲	\Pisymbol{astrosym}{52}	○	\Pisymbol{astrosym}{200}
□	\Pisymbol{astrosym}{53}	⌚	\Pisymbol{astrosym}{201}
♫	\Pisymbol{astrosym}{54}	⌚	\Pisymbol{astrosym}{202}
ଓ	\Pisymbol{astrosym}{55}	⌚	\Pisymbol{astrosym}{203}
⌚	\Pisymbol{astrosym}{56}	♂	\Pisymbol{astrosym}{204}
⌚	\Pisymbol{astrosym}{57}	♀	\Pisymbol{astrosym}{205}
⌚	\Pisymbol{astrosym}{58}	↑	\Pisymbol{astrosym}{206}
⌚	\Pisymbol{astrosym}{59}	○	\Pisymbol{astrosym}{207}
*	\Pisymbol{astrosym}{60}	↑↑	\Pisymbol{astrosym}{208}
△	\Pisymbol{astrosym}{61}	▷	\Pisymbol{astrosym}{209}
□	\Pisymbol{astrosym}{62}	⌚	\Pisymbol{astrosym}{210}
×	\Pisymbol{astrosym}{63}	⌚	\Pisymbol{astrosym}{211}
⌚	\Pisymbol{astrosym}{64}	⌚	\Pisymbol{astrosym}{212}
⌚	\Pisymbol{astrosym}{65}	⌚	\Pisymbol{astrosym}{213}
⌚	\Pisymbol{astrosym}{66}	⌚	\Pisymbol{astrosym}{214}
⌚	\Pisymbol{astrosym}{67}	⌚	\Pisymbol{astrosym}{215}

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⌚	\Pisymbol{astrosym}{68}	♏	\Pisymbol{astrosym}{216}
*	\Pisymbol{astrosym}{69}	♑	\Pisymbol{astrosym}{217}
☽	\Pisymbol{astrosym}{90}	♏	\Pisymbol{astrosym}{218}
☾	\Pisymbol{astrosym}{91}	↗	\Pisymbol{astrosym}{219}
☽	\Pisymbol{astrosym}{92}	♑	\Pisymbol{astrosym}{220}
☽	\Pisymbol{astrosym}{93}	♒	\Pisymbol{astrosym}{221}
☽	\Pisymbol{astrosym}{94}	♓	\Pisymbol{astrosym}{222}
☽	\Pisymbol{astrosym}{95}	♑	\Pisymbol{astrosym}{223}
○	\Pisymbol{astrosym}{100}	↑↑	\Pisymbol{astrosym}{224}
○	\Pisymbol{astrosym}{101}	↑↑	\Pisymbol{astrosym}{225}
○	\Pisymbol{astrosym}{102}	♎	\Pisymbol{astrosym}{226}
♂	\Pisymbol{astrosym}{103}	≈	\Pisymbol{astrosym}{227}
♂	\Pisymbol{astrosym}{104}	≈≈	\Pisymbol{astrosym}{228}
♀	\Pisymbol{astrosym}{105}	⊕	\Pisymbol{astrosym}{229}
☿	\Pisymbol{astrosym}{106}	♂	\Pisymbol{astrosym}{230}
○	\Pisymbol{astrosym}{107}	♲	\Pisymbol{astrosym}{231}
↑↑	\Pisymbol{astrosym}{108}	♎	\Pisymbol{astrosym}{232}
P	\Pisymbol{astrosym}{109}	*	\Pisymbol{astrosym}{233}
♋	\Pisymbol{astrosym}{110}	♌	\Pisymbol{astrosym}{234}
♍	\Pisymbol{astrosym}{111}	↙	\Pisymbol{astrosym}{235}
♎	\Pisymbol{astrosym}{112}	♎	\Pisymbol{astrosym}{236}
♏	\Pisymbol{astrosym}{113}	♎	\Pisymbol{astrosym}{237}
♏	\Pisymbol{astrosym}{114}	□	\Pisymbol{astrosym}{238}
♏	\Pisymbol{astrosym}{115}	○	\Pisymbol{astrosym}{239}
♏	\Pisymbol{astrosym}{116}	●	\Pisymbol{astrosym}{240}
♏	\Pisymbol{astrosym}{117}	○	\Pisymbol{astrosym}{241}
♏	\Pisymbol{astrosym}{118}	●	\Pisymbol{astrosym}{242}
↗	\Pisymbol{astrosym}{119}	●	\Pisymbol{astrosym}{243}
♑	\Pisymbol{astrosym}{120}	○	\Pisymbol{astrosym}{244}
♒	\Pisymbol{astrosym}{121}	○	\Pisymbol{astrosym}{245}
♓	\Pisymbol{astrosym}{122}	●	\Pisymbol{astrosym}{246}
♑	\Pisymbol{astrosym}{123}	●	\Pisymbol{astrosym}{247}
↑↑	\Pisymbol{astrosym}{124}	○	\Pisymbol{astrosym}{248}
↑↑	\Pisymbol{astrosym}{125}	○	\Pisymbol{astrosym}{249}
♎	\Pisymbol{astrosym}{126}	*	\Pisymbol{astrosym}{250}
≋	\Pisymbol{astrosym}{127}	*	\Pisymbol{astrosym}{251}

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	\Pisymbol{astrosym}{128}		\Pisymbol{astrosym}{252}
	\Pisymbol{astrosym}{129}		\Pisymbol{astrosym}{253}
	\Pisymbol{astrosym}{130}		\Pisymbol{astrosym}{254}
	\Pisymbol{astrosym}{131}		\Pisymbol{astrosym}{255}

TABLE 672: webomints Decorative Borders

	\Pisymbol{WebOMintsGD}{47}		\Pisymbol{WebOMintsGD}{87}
	\Pisymbol{WebOMintsGD}{48}		\Pisymbol{WebOMintsGD}{88}
	\Pisymbol{WebOMintsGD}{49}		\Pisymbol{WebOMintsGD}{89}
	\Pisymbol{WebOMintsGD}{50}		\Pisymbol{WebOMintsGD}{90}
	\Pisymbol{WebOMintsGD}{51}		\Pisymbol{WebOMintsGD}{91}
	\Pisymbol{WebOMintsGD}{52}		\Pisymbol{WebOMintsGD}{93}
	\Pisymbol{WebOMintsGD}{53}		\Pisymbol{WebOMintsGD}{97}
	\Pisymbol{WebOMintsGD}{54}		\Pisymbol{WebOMintsGD}{98}
	\Pisymbol{WebOMintsGD}{55}		\Pisymbol{WebOMintsGD}{99}
	\Pisymbol{WebOMintsGD}{56}		\Pisymbol{WebOMintsGD}{100}
	\Pisymbol{WebOMintsGD}{57}		\Pisymbol{WebOMintsGD}{101}
	\Pisymbol{WebOMintsGD}{65}		\Pisymbol{WebOMintsGD}{102}
	\Pisymbol{WebOMintsGD}{66}		\Pisymbol{WebOMintsGD}{103}
	\Pisymbol{WebOMintsGD}{67}		\Pisymbol{WebOMintsGD}{104}
	\Pisymbol{WebOMintsGD}{68}		\Pisymbol{WebOMintsGD}{105}
	\Pisymbol{WebOMintsGD}{69}		\Pisymbol{WebOMintsGD}{106}
	\Pisymbol{WebOMintsGD}{70}		\Pisymbol{WebOMintsGD}{107}
	\Pisymbol{WebOMintsGD}{71}		\Pisymbol{WebOMintsGD}{108}
	\Pisymbol{WebOMintsGD}{72}		\Pisymbol{WebOMintsGD}{109}
	\Pisymbol{WebOMintsGD}{73}		\Pisymbol{WebOMintsGD}{110}
	\Pisymbol{WebOMintsGD}{74}		\Pisymbol{WebOMintsGD}{111}
	\Pisymbol{WebOMintsGD}{75}		\Pisymbol{WebOMintsGD}{112}
	\Pisymbol{WebOMintsGD}{76}		\Pisymbol{WebOMintsGD}{113}
	\Pisymbol{WebOMintsGD}{77}		\Pisymbol{WebOMintsGD}{114}
	\Pisymbol{WebOMintsGD}{78}		\Pisymbol{WebOMintsGD}{115}
	\Pisymbol{WebOMintsGD}{79}		\Pisymbol{WebOMintsGD}{116}
	\Pisymbol{WebOMintsGD}{80}		\Pisymbol{WebOMintsGD}{117}
	\Pisymbol{WebOMintsGD}{81}		\Pisymbol{WebOMintsGD}{118}
	\Pisymbol{WebOMintsGD}{82}		\Pisymbol{WebOMintsGD}{119}

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	\Pisymbol{WebOMintsGD}{83}		\Pisymbol{WebOMintsGD}{120}
	\Pisymbol{WebOMintsGD}{84}		\Pisymbol{WebOMintsGD}{121}
	\Pisymbol{WebOMintsGD}{85}		\Pisymbol{WebOMintsGD}{122}
	\Pisymbol{WebOMintsGD}{86}		

`webomints` provides a `uwebo.fd` font-definition file. Instead of using `pifont` and `\Pisymbol` to typeset a glyph, a document can select the `webomints` font directly. For example, `\usefont{U}{webo}{x1}{n}\char73\char74`—alternatively, `\usefont{U}{webo}{x1}{n}IJ`—will typeset “”. This can be useful for typesetting a number of `webomints` glyphs in a row.

The `niceframe` package can be used to typeset decorative frames using fonts such as `webomints`.

TABLE 673: `umranda` Decorative Borders

	\Pisymbol{umranda}{0}		\Pisymbol{umranda}{34}		\Pisymbol{umranda}{68}
	\Pisymbol{umranda}{1}		\Pisymbol{umranda}{35}		\Pisymbol{umranda}{69}
	\Pisymbol{umranda}{2}		\Pisymbol{umranda}{36}		\Pisymbol{umranda}{70}
	\Pisymbol{umranda}{3}		\Pisymbol{umranda}{37}		\Pisymbol{umranda}{71}
	\Pisymbol{umranda}{4}		\Pisymbol{umranda}{38}		\Pisymbol{umranda}{72}
	\Pisymbol{umranda}{5}		\Pisymbol{umranda}{39}		\Pisymbol{umranda}{73}
	\Pisymbol{umranda}{6}		\Pisymbol{umranda}{40}		\Pisymbol{umranda}{74}
	\Pisymbol{umranda}{7}		\Pisymbol{umranda}{41}		\Pisymbol{umranda}{75}
	\Pisymbol{umranda}{8}		\Pisymbol{umranda}{42}		\Pisymbol{umranda}{76}
	\Pisymbol{umranda}{9}		\Pisymbol{umranda}{43}		\Pisymbol{umranda}{77}
	\Pisymbol{umranda}{10}		\Pisymbol{umranda}{44}		\Pisymbol{umranda}{78}
	\Pisymbol{umranda}{11}		\Pisymbol{umranda}{45}		\Pisymbol{umranda}{79}
	\Pisymbol{umranda}{12}		\Pisymbol{umranda}{46}		\Pisymbol{umranda}{80}
	\Pisymbol{umranda}{13}		\Pisymbol{umranda}{47}		\Pisymbol{umranda}{81}
	\Pisymbol{umranda}{14}		\Pisymbol{umranda}{48}		\Pisymbol{umranda}{82}
	\Pisymbol{umranda}{15}		\Pisymbol{umranda}{49}		\Pisymbol{umranda}{83}
	\Pisymbol{umranda}{16}		\Pisymbol{umranda}{50}		\Pisymbol{umranda}{84}

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	\Pisymbol{umranda}{17}		\Pisymbol{umranda}{51}		\Pisymbol{umranda}{85}
	\Pisymbol{umranda}{18}		\Pisymbol{umranda}{52}		\Pisymbol{umranda}{86}
	\Pisymbol{umranda}{19}		\Pisymbol{umranda}{53}		\Pisymbol{umranda}{87}
	\Pisymbol{umranda}{20}		\Pisymbol{umranda}{54}		\Pisymbol{umranda}{88}
	\Pisymbol{umranda}{21}		\Pisymbol{umranda}{55}		\Pisymbol{umranda}{89}
	\Pisymbol{umranda}{22}		\Pisymbol{umranda}{56}		\Pisymbol{umranda}{90}
	\Pisymbol{umranda}{23}		\Pisymbol{umranda}{57}		\Pisymbol{umranda}{91}
	\Pisymbol{umranda}{24}		\Pisymbol{umranda}{58}		\Pisymbol{umranda}{92}
	\Pisymbol{umranda}{25}		\Pisymbol{umranda}{59}		\Pisymbol{umranda}{93}
	\Pisymbol{umranda}{26}		\Pisymbol{umranda}{60}		\Pisymbol{umranda}{94}
	\Pisymbol{umranda}{27}		\Pisymbol{umranda}{61}		\Pisymbol{umranda}{95}
	\Pisymbol{umranda}{28}		\Pisymbol{umranda}{62}		\Pisymbol{umranda}{96}
	\Pisymbol{umranda}{29}		\Pisymbol{umranda}{63}		\Pisymbol{umranda}{97}
	\Pisymbol{umranda}{30}		\Pisymbol{umranda}{64}		\Pisymbol{umranda}{98}
	\Pisymbol{umranda}{31}		\Pisymbol{umranda}{65}		\Pisymbol{umranda}{99}
	\Pisymbol{umranda}{32}		\Pisymbol{umranda}{66}		\Pisymbol{umranda}{100}
	\Pisymbol{umranda}{33}		\Pisymbol{umranda}{67}		\Pisymbol{umranda}{101}

The niceframe package can be used to typeset decorative frames using fonts such as umranda.

TABLE 674: umrandb Decorative Borders

	\Pisymbol{umrandb}{0}		\Pisymbol{umrandb}{42}		\Pisymbol{umrandb}{84}
	\Pisymbol{umrandb}{1}		\Pisymbol{umrandb}{43}		\Pisymbol{umrandb}{85}
	\Pisymbol{umrandb}{2}		\Pisymbol{umrandb}{44}		\Pisymbol{umrandb}{86}
	\Pisymbol{umrandb}{3}		\Pisymbol{umrandb}{45}		\Pisymbol{umrandb}{87}
	\Pisymbol{umrandb}{4}		\Pisymbol{umrandb}{46}		\Pisymbol{umrandb}{88}
	\Pisymbol{umrandb}{5}		\Pisymbol{umrandb}{47}		\Pisymbol{umrandb}{89}
	\Pisymbol{umrandb}{6}		\Pisymbol{umrandb}{48}		\Pisymbol{umrandb}{90}
	\Pisymbol{umrandb}{7}		\Pisymbol{umrandb}{49}		\Pisymbol{umrandb}{91}
	\Pisymbol{umrandb}{8}		\Pisymbol{umrandb}{50}		\Pisymbol{umrandb}{92}

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	\Pisymbol{umrandb}{9}		\Pisymbol{umrandb}{51}		\Pisymbol{umrandb}{93}
	\Pisymbol{umrandb}{10}		\Pisymbol{umrandb}{52}		\Pisymbol{umrandb}{94}
	\Pisymbol{umrandb}{11}		\Pisymbol{umrandb}{53}		\Pisymbol{umrandb}{95}
	\Pisymbol{umrandb}{12}		\Pisymbol{umrandb}{54}		\Pisymbol{umrandb}{96}
	\Pisymbol{umrandb}{13}		\Pisymbol{umrandb}{55}		\Pisymbol{umrandb}{97}
	\Pisymbol{umrandb}{14}		\Pisymbol{umrandb}{56}		\Pisymbol{umrandb}{98}
	\Pisymbol{umrandb}{15}		\Pisymbol{umrandb}{57}		\Pisymbol{umrandb}{99}
	\Pisymbol{umrandb}{16}		\Pisymbol{umrandb}{58}		\Pisymbol{umrandb}{100}
	\Pisymbol{umrandb}{17}		\Pisymbol{umrandb}{59}		\Pisymbol{umrandb}{101}
	\Pisymbol{umrandb}{18}		\Pisymbol{umrandb}{60}		\Pisymbol{umrandb}{102}
	\Pisymbol{umrandb}{19}		\Pisymbol{umrandb}{61}		\Pisymbol{umrandb}{103}
	\Pisymbol{umrandb}{20}		\Pisymbol{umrandb}{62}		\Pisymbol{umrandb}{104}
	\Pisymbol{umrandb}{21}		\Pisymbol{umrandb}{63}		\Pisymbol{umrandb}{105}
	\Pisymbol{umrandb}{22}		\Pisymbol{umrandb}{64}		\Pisymbol{umrandb}{106}
	\Pisymbol{umrandb}{23}		\Pisymbol{umrandb}{65}		\Pisymbol{umrandb}{107}
	\Pisymbol{umrandb}{24}		\Pisymbol{umrandb}{66}		\Pisymbol{umrandb}{108}
	\Pisymbol{umrandb}{25}		\Pisymbol{umrandb}{67}		\Pisymbol{umrandb}{109}
	\Pisymbol{umrandb}{26}		\Pisymbol{umrandb}{68}		\Pisymbol{umrandb}{110}
	\Pisymbol{umrandb}{27}		\Pisymbol{umrandb}{69}		\Pisymbol{umrandb}{111}
	\Pisymbol{umrandb}{28}		\Pisymbol{umrandb}{70}		\Pisymbol{umrandb}{112}
	\Pisymbol{umrandb}{29}		\Pisymbol{umrandb}{71}		\Pisymbol{umrandb}{113}
	\Pisymbol{umrandb}{30}		\Pisymbol{umrandb}{72}		\Pisymbol{umrandb}{114}
	\Pisymbol{umrandb}{31}		\Pisymbol{umrandb}{73}		\Pisymbol{umrandb}{115}
	\Pisymbol{umrandb}{32}		\Pisymbol{umrandb}{74}		\Pisymbol{umrandb}{116}
	\Pisymbol{umrandb}{33}		\Pisymbol{umrandb}{75}		\Pisymbol{umrandb}{117}
	\Pisymbol{umrandb}{34}		\Pisymbol{umrandb}{76}		\Pisymbol{umrandb}{118}
	\Pisymbol{umrandb}{35}		\Pisymbol{umrandb}{77}		\Pisymbol{umrandb}{119}
	\Pisymbol{umrandb}{36}		\Pisymbol{umrandb}{78}		\Pisymbol{umrandb}{120}
	\Pisymbol{umrandb}{37}		\Pisymbol{umrandb}{79}		\Pisymbol{umrandb}{121}
	\Pisymbol{umrandb}{38}		\Pisymbol{umrandb}{80}		\Pisymbol{umrandb}{122}
	\Pisymbol{umrandb}{39}		\Pisymbol{umrandb}{81}		\Pisymbol{umrandb}{123}
	\Pisymbol{umrandb}{40}		\Pisymbol{umrandb}{82}		
	\Pisymbol{umrandb}{41}		\Pisymbol{umrandb}{83}		

The `niceframe` package can be used to typeset decorative frames using fonts such as `umrandb`.

TABLE 675: *dingbat* Decorative Borders

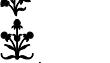
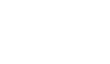
	\Pisymbol{dingbat}{69}		\Pisymbol{dingbat}{97}
	\Pisymbol{dingbat}{70}		\Pisymbol{dingbat}{98}
	\Pisymbol{dingbat}{71}		\Pisymbol{dingbat}{99}
	\Pisymbol{dingbat}{72}		\Pisymbol{dingbat}{100}
	\Pisymbol{dingbat}{74}		\Pisymbol{dingbat}{101}
	\Pisymbol{dingbat}{75}		\Pisymbol{dingbat}{102}
	\Pisymbol{dingbat}{76}		\Pisymbol{dingbat}{103}
	\Pisymbol{dingbat}{77}		\Pisymbol{dingbat}{104}

The preceding table is incomplete in that it includes only unnamed *dingbat* symbols. Named symbols are included in Table 403 and Table 451 (both intermixed with symbols from the *ark10* font).

The *dingbat* package includes a *udingbat.fd* file so a document does not need to specify the `\DeclareFontFamily` and `\DeclareFontShape` commands list at the beginning of Chapter 11.

The *niceframe* package can be used to typeset decorative frames using fonts such as *dingbat*.

TABLE 676: pgfornament Decorative Borders (Vintage)

	\pgfornament{1}		\pgfornament{102}
	\pgfornament{2}		\pgfornament{103}
	\pgfornament{3}		\pgfornament{104}
	\pgfornament{4}		\pgfornament{105}
	\pgfornament{5}		\pgfornament{106}
	\pgfornament{6}		\pgfornament{107}
	\pgfornament{7}		\pgfornament{108}
	\pgfornament{8}		\pgfornament{109}
	\pgfornament{9}		\pgfornament{110}
	\pgfornament{10}		\pgfornament{111}
	\pgfornament{11}		\pgfornament{112}
	\pgfornament{12}		\pgfornament{113}
	\pgfornament{13}		\pgfornament{114}
	\pgfornament{14}		\pgfornament{115}
	\pgfornament{15}		\pgfornament{116}
	\pgfornament{16}		\pgfornament{117}
	\pgfornament{17}		\pgfornament{118}
	\pgfornament{18}		\pgfornament{119}
	\pgfornament{19}		\pgfornament{120}
	\pgfornament{20}		\pgfornament{121}
	\pgfornament{21}		\pgfornament{122}
	\pgfornament{22}		\pgfornament{123}
	\pgfornament{23}		\pgfornament{124}
	\pgfornament{24}		\pgfornament{125}
	\pgfornament{25}		\pgfornament{126}
	\pgfornament{26}		\pgfornament{127}
	\pgfornament{27}		\pgfornament{128}
	\pgfornament{28}		\pgfornament{129}
	\pgfornament{29}		\pgfornament{130}
	\pgfornament{30}		\pgfornament{131}
	\pgfornament{31}		\pgfornament{132}
	\pgfornament{32}		\pgfornament{133}

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	\pgfornament{33}		\pgfornament{134}
	\pgfornament{34}		\pgfornament{135}
	\pgfornament{35}		\pgfornament{136}
	\pgfornament{36}		\pgfornament{137}
	\pgfornament{37}		\pgfornament{138}
	\pgfornament{38}		\pgfornament{139}
	\pgfornament{39}		\pgfornament{140}
	\pgfornament{40}		\pgfornament{141}
	\pgfornament{41}		\pgfornament{142}
	\pgfornament{42}		\pgfornament{143}
	\pgfornament{43}		\pgfornament{144}
	\pgfornament{44}		\pgfornament{145}
	\pgfornament{45}		\pgfornament{146}
	\pgfornament{46}		\pgfornament{147}
	\pgfornament{47}		\pgfornament{148}
	\pgfornament{48}		\pgfornament{149}
	\pgfornament{49}		\pgfornament{150}
	\pgfornament{50}		\pgfornament{151}
	\pgfornament{51}		\pgfornament{152}
	\pgfornament{52}		\pgfornament{153}
	\pgfornament{53}		\pgfornament{154}
	\pgfornament{54}		\pgfornament{155}
	\pgfornament{55}		\pgfornament{156}
	\pgfornament{56}		\pgfornament{157}
	\pgfornament{57}		\pgfornament{158}
	\pgfornament{58}		\pgfornament{159}
	\pgfornament{59}		\pgfornament{160}
	\pgfornament{60}		\pgfornament{161}
	\pgfornament{61}		\pgfornament{162}
	\pgfornament{62}		\pgfornament{163}
	\pgfornament{63}		\pgfornament{164}
	\pgfornament{64}		\pgfornament{165}
	\pgfornament{65}		\pgfornament{166}

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	\pgfornament{66}		\pgfornament{167}
	\pgfornament{67}		\pgfornament{168}
	\pgfornament{68}		\pgfornament{169}
	\pgfornament{69}		\pgfornament{171}
	\pgfornament{70}		\pgfornament{172}
	\pgfornament{71}		\pgfornament{173}
	\pgfornament{72}		\pgfornament{174}
	\pgfornament{73}		\pgfornament{175}
	\pgfornament{74}		\pgfornament{176}
	\pgfornament{75}		\pgfornament{177}
	\pgfornament{76}		\pgfornament{178}
	\pgfornament{77}		\pgfornament{179}
	\pgfornament{78}		\pgfornament{180}
	\pgfornament{79}		\pgfornament{181}
	\pgfornament{81}		\pgfornament{182}
	\pgfornament{84}		\pgfornament{183}
	\pgfornament{87}		\pgfornament{184}
	\pgfornament{90}		\pgfornament{185}
	\pgfornament{91}		\pgfornament{186}
	\pgfornament{92}		\pgfornament{187}
	\pgfornament{93}		\pgfornament{188}
	\pgfornament{94}		\pgfornament{189}
	\pgfornament{95}		\pgfornament{190}
	\pgfornament{96}		\pgfornament{191}
	\pgfornament{97}		\pgfornament{192}
	\pgfornament{98}		\pgfornament{193}
	\pgfornament{99}		\pgfornament{194}
	\pgfornament{100}		\pgfornament{195}
	\pgfornament{101}		\pgfornament{196}

The symbols in this table are selected with `\newpgfornamentfamily {vectorian}`. All `pgfornament` symbols are implemented with TikZ graphics, not with a font. The `\pgfornament` command supports resizing, coloring, and rotating symbols. See the `pgfornament` documentation for more information.

The following symbols are omitted from the table due to their width:

	<code>\pgfornament{80}</code>
	<code>\pgfornament{82}</code>
	<code>\pgfornament{83}</code>
	<code>\pgfornament{85}</code>
	<code>\pgfornament{86}</code>
	<code>\pgfornament{88}</code>

TABLE 677: `pgfornament` Decorative Borders (Traditional Chinese Motifs)

	<code>\pgfornament{1}</code>		<code>\pgfornament{42}</code>
	<code>\pgfornament{2}</code>		<code>\pgfornament{43}</code>
	<code>\pgfornament{3}</code>		<code>\pgfornament{44}</code>
	<code>\pgfornament{4}</code>		<code>\pgfornament{45}</code>
	<code>\pgfornament{5}</code>		<code>\pgfornament{46}</code>
	<code>\pgfornament{6}</code>		<code>\pgfornament{47}</code>
	<code>\pgfornament{7}</code>		<code>\pgfornament{48}</code>
	<code>\pgfornament{8}</code>		<code>\pgfornament{49}</code>
	<code>\pgfornament{9}</code>		<code>\pgfornament{50}</code>
	<code>\pgfornament{10}</code>		<code>\pgfornament{51}</code>
	<code>\pgfornament{11}</code>		<code>\pgfornament{52}</code>

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	\pgfornament{12}		\pgfornament{53}
	\pgfornament{13}		\pgfornament{54}
	\pgfornament{14}		\pgfornament{55}
	\pgfornament{15}		\pgfornament{56}
	\pgfornament{16}		\pgfornament{57}
	\pgfornament{17}		\pgfornament{58}
	\pgfornament{18}		\pgfornament{59}
	\pgfornament{19}		\pgfornament{60}
	\pgfornament{20}		\pgfornament{61}
	\pgfornament{21}		\pgfornament{62}
	\pgfornament{22}		\pgfornament{63}
	\pgfornament{23}		\pgfornament{64}
	\pgfornament{24}		\pgfornament{65}
	\pgfornament{25}		\pgfornament{66}
	\pgfornament{26}		\pgfornament{67}
	\pgfornament{27}		\pgfornament{68}
	\pgfornament{28}		\pgfornament{69}
	\pgfornament{33}		\pgfornament{70}
	\pgfornament{34}		\pgfornament{71}
	\pgfornament{35}		\pgfornament{72}
	\pgfornament{36}		\pgfornament{73}

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	\pgfornament{37}		\pgfornament{74}
	\pgfornament{38}		\pgfornament{75}
	\pgfornament{39}		\pgfornament{76}
	\pgfornament{40}		\pgfornament{77}
	\pgfornament{41}		\pgfornament{78}

The symbols in this table are selected with \newpgfornamentfamily{han}. All pgfornament symbols are implemented with TikZ graphics, not with a font. The \pgfornament command supports resizing, coloring, and rotating symbols. See the pgfornament documentation for more information.

Not shown in the table due to their width are \pgfornament{29}, \pgfornament{30}, \pgfornament{31}, and \pgfornament{32}. These represent various horizontal rules (thick, double thin, double thick, and triple thin, respectively).

TABLE 678: knot Celtic Knots

	\Pisymbol{knot1}{48}		\Pisymbol{knot1}{68}		\Pisymbol{knot1}{84}
	\Pisymbol{knot1}{49}		\Pisymbol{knot1}{69}		\Pisymbol{knot1}{85}
	\Pisymbol{knot1}{50}		\Pisymbol{knot1}{70}		\Pisymbol{knot1}{86}
◆	\Pisymbol{knot1}{51}		\Pisymbol{knot1}{71}		\Pisymbol{knot1}{87}
●	\Pisymbol{knot1}{52}		\Pisymbol{knot1}{72}		\Pisymbol{knot1}{88}
	\Pisymbol{knot1}{53}		\Pisymbol{knot1}{73}		\Pisymbol{knot1}{96}
	\Pisymbol{knot1}{58}		\Pisymbol{knot1}{74}		\Pisymbol{knot1}{97}
	\Pisymbol{knot1}{59}		\Pisymbol{knot1}{75}		\Pisymbol{knot1}{98}
	\Pisymbol{knot1}{60}		\Pisymbol{knot1}{76}		\Pisymbol{knot1}{99}
	\Pisymbol{knot1}{61}		\Pisymbol{knot1}{77}		\Pisymbol{knot1}{100}
	\Pisymbol{knot1}{62}		\Pisymbol{knot1}{78}		\Pisymbol{knot1}{101}
	\Pisymbol{knot1}{63}		\Pisymbol{knot1}{79}		\Pisymbol{knot1}{102}
	\Pisymbol{knot1}{64}		\Pisymbol{knot1}{80}		\Pisymbol{knot1}{103}

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	\Pisymbol{knot1}{65}		\Pisymbol{knot1}{81}		\Pisymbol{knot1}{104}
	\Pisymbol{knot1}{66}		\Pisymbol{knot1}{82}		\Pisymbol{knot1}{105}
	\Pisymbol{knot1}{67}		\Pisymbol{knot1}{83}		
	\Pisymbol{knot2}{48}		\Pisymbol{knot2}{68}		\Pisymbol{knot2}{84}
	\Pisymbol{knot2}{49}		\Pisymbol{knot2}{69}		\Pisymbol{knot2}{85}
	\Pisymbol{knot2}{50}		\Pisymbol{knot2}{70}		\Pisymbol{knot2}{86}
◆	\Pisymbol{knot2}{51}		\Pisymbol{knot2}{71}		\Pisymbol{knot2}{87}
●	\Pisymbol{knot2}{52}		\Pisymbol{knot2}{72}		\Pisymbol{knot2}{88}
	\Pisymbol{knot2}{53}		\Pisymbol{knot2}{73}		\Pisymbol{knot2}{96}
	\Pisymbol{knot2}{58}		\Pisymbol{knot2}{74}		\Pisymbol{knot2}{97}
	\Pisymbol{knot2}{59}		\Pisymbol{knot2}{75}		\Pisymbol{knot2}{98}
	\Pisymbol{knot2}{60}		\Pisymbol{knot2}{76}		\Pisymbol{knot2}{99}
	\Pisymbol{knot2}{61}		\Pisymbol{knot2}{77}		\Pisymbol{knot2}{100}
	\Pisymbol{knot2}{62}		\Pisymbol{knot2}{78}		\Pisymbol{knot2}{101}
	\Pisymbol{knot2}{63}		\Pisymbol{knot2}{79}		\Pisymbol{knot2}{102}
	\Pisymbol{knot2}{64}		\Pisymbol{knot2}{80}		\Pisymbol{knot2}{103}
	\Pisymbol{knot2}{65}		\Pisymbol{knot2}{81}		\Pisymbol{knot2}{104}
	\Pisymbol{knot2}{66}		\Pisymbol{knot2}{82}		\Pisymbol{knot2}{105}
	\Pisymbol{knot2}{67}		\Pisymbol{knot2}{83}		
	\Pisymbol{knot3}{48}		\Pisymbol{knot3}{68}		\Pisymbol{knot3}{84}
	\Pisymbol{knot3}{49}		\Pisymbol{knot3}{69}		\Pisymbol{knot3}{85}
	\Pisymbol{knot3}{50}		\Pisymbol{knot3}{70}		\Pisymbol{knot3}{86}
◆	\Pisymbol{knot3}{51}		\Pisymbol{knot3}{71}		\Pisymbol{knot3}{87}
●	\Pisymbol{knot3}{52}		\Pisymbol{knot3}{72}		\Pisymbol{knot3}{88}
	\Pisymbol{knot3}{53}		\Pisymbol{knot3}{73}		\Pisymbol{knot3}{96}
	\Pisymbol{knot3}{58}		\Pisymbol{knot3}{74}		\Pisymbol{knot3}{97}
	\Pisymbol{knot3}{59}		\Pisymbol{knot3}{75}		\Pisymbol{knot3}{98}
	\Pisymbol{knot3}{60}		\Pisymbol{knot3}{76}		\Pisymbol{knot3}{99}
	\Pisymbol{knot3}{61}		\Pisymbol{knot3}{77}		\Pisymbol{knot3}{100}
	\Pisymbol{knot3}{62}		\Pisymbol{knot3}{78}		\Pisymbol{knot3}{101}
	\Pisymbol{knot3}{63}		\Pisymbol{knot3}{79}		\Pisymbol{knot3}{102}
	\Pisymbol{knot3}{64}		\Pisymbol{knot3}{80}		\Pisymbol{knot3}{103}

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	\Pisymbol{knot3}{65}		\Pisymbol{knot3}{81}		\Pisymbol{knot3}{104}
	\Pisymbol{knot3}{66}		\Pisymbol{knot3}{82}		\Pisymbol{knot3}{105}
	\Pisymbol{knot3}{67}		\Pisymbol{knot3}{83}		
	\Pisymbol{knot4}{48}		\Pisymbol{knot4}{68}		\Pisymbol{knot4}{84}
	\Pisymbol{knot4}{49}		\Pisymbol{knot4}{69}		\Pisymbol{knot4}{85}
	\Pisymbol{knot4}{50}		\Pisymbol{knot4}{70}		\Pisymbol{knot4}{86}
◆	\Pisymbol{knot4}{51}		\Pisymbol{knot4}{71}		\Pisymbol{knot4}{87}
●	\Pisymbol{knot4}{52}		\Pisymbol{knot4}{72}		\Pisymbol{knot4}{88}
	\Pisymbol{knot4}{53}		\Pisymbol{knot4}{73}		\Pisymbol{knot4}{96}
	\Pisymbol{knot4}{58}		\Pisymbol{knot4}{74}		\Pisymbol{knot4}{97}
	\Pisymbol{knot4}{59}		\Pisymbol{knot4}{75}		\Pisymbol{knot4}{98}
	\Pisymbol{knot4}{60}		\Pisymbol{knot4}{76}		\Pisymbol{knot4}{99}
	\Pisymbol{knot4}{61}		\Pisymbol{knot4}{77}		\Pisymbol{knot4}{100}
	\Pisymbol{knot4}{62}		\Pisymbol{knot4}{78}		\Pisymbol{knot4}{101}
	\Pisymbol{knot4}{63}		\Pisymbol{knot4}{79}		\Pisymbol{knot4}{102}
	\Pisymbol{knot4}{64}		\Pisymbol{knot4}{80}		\Pisymbol{knot4}{103}
	\Pisymbol{knot4}{65}		\Pisymbol{knot4}{81}		\Pisymbol{knot4}{104}
	\Pisymbol{knot4}{66}		\Pisymbol{knot4}{82}		\Pisymbol{knot4}{105}
	\Pisymbol{knot4}{67}		\Pisymbol{knot4}{83}		
	\Pisymbol{knot5}{48}		\Pisymbol{knot5}{68}		\Pisymbol{knot5}{84}
	\Pisymbol{knot5}{49}		\Pisymbol{knot5}{69}		\Pisymbol{knot5}{85}
	\Pisymbol{knot5}{50}		\Pisymbol{knot5}{70}		\Pisymbol{knot5}{86}
◆	\Pisymbol{knot5}{51}		\Pisymbol{knot5}{71}		\Pisymbol{knot5}{87}
●	\Pisymbol{knot5}{52}		\Pisymbol{knot5}{72}		\Pisymbol{knot5}{88}
	\Pisymbol{knot5}{53}		\Pisymbol{knot5}{73}		\Pisymbol{knot5}{96}
	\Pisymbol{knot5}{58}		\Pisymbol{knot5}{74}		\Pisymbol{knot5}{97}
	\Pisymbol{knot5}{59}		\Pisymbol{knot5}{75}		\Pisymbol{knot5}{98}
	\Pisymbol{knot5}{60}		\Pisymbol{knot5}{76}		\Pisymbol{knot5}{99}
	\Pisymbol{knot5}{61}		\Pisymbol{knot5}{77}		\Pisymbol{knot5}{100}
	\Pisymbol{knot5}{62}		\Pisymbol{knot5}{78}		\Pisymbol{knot5}{101}
	\Pisymbol{knot5}{63}		\Pisymbol{knot5}{79}		\Pisymbol{knot5}{102}
	\Pisymbol{knot5}{64}		\Pisymbol{knot5}{80}		\Pisymbol{knot5}{103}

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	\Pisymbol{knot5}{65}		\Pisymbol{knot5}{81}		\Pisymbol{knot5}{104}
	\Pisymbol{knot5}{66}		\Pisymbol{knot5}{82}		\Pisymbol{knot5}{105}
	\Pisymbol{knot5}{67}		\Pisymbol{knot5}{83}		
	\Pisymbol{knot6}{48}		\Pisymbol{knot6}{68}		\Pisymbol{knot6}{84}
	\Pisymbol{knot6}{49}		\Pisymbol{knot6}{69}		\Pisymbol{knot6}{85}
	\Pisymbol{knot6}{50}		\Pisymbol{knot6}{70}		\Pisymbol{knot6}{86}
◆	\Pisymbol{knot6}{51}		\Pisymbol{knot6}{71}		\Pisymbol{knot6}{87}
●	\Pisymbol{knot6}{52}		\Pisymbol{knot6}{72}		\Pisymbol{knot6}{88}
	\Pisymbol{knot6}{53}		\Pisymbol{knot6}{73}		\Pisymbol{knot6}{96}
	\Pisymbol{knot6}{58}		\Pisymbol{knot6}{74}		\Pisymbol{knot6}{97}
	\Pisymbol{knot6}{59}		\Pisymbol{knot6}{75}		\Pisymbol{knot6}{98}
	\Pisymbol{knot6}{60}		\Pisymbol{knot6}{76}		\Pisymbol{knot6}{99}
	\Pisymbol{knot6}{61}		\Pisymbol{knot6}{77}		\Pisymbol{knot6}{100}
	\Pisymbol{knot6}{62}		\Pisymbol{knot6}{78}		\Pisymbol{knot6}{101}
	\Pisymbol{knot6}{63}		\Pisymbol{knot6}{79}		\Pisymbol{knot6}{102}
	\Pisymbol{knot6}{64}		\Pisymbol{knot6}{80}		\Pisymbol{knot6}{103}
	\Pisymbol{knot6}{65}		\Pisymbol{knot6}{81}		\Pisymbol{knot6}{104}
	\Pisymbol{knot6}{66}		\Pisymbol{knot6}{82}		\Pisymbol{knot6}{105}
	\Pisymbol{knot6}{67}		\Pisymbol{knot6}{83}		
	\Pisymbol{knot7}{48}		\Pisymbol{knot7}{68}		\Pisymbol{knot7}{84}
	\Pisymbol{knot7}{49}		\Pisymbol{knot7}{69}		\Pisymbol{knot7}{85}
	\Pisymbol{knot7}{50}		\Pisymbol{knot7}{70}		\Pisymbol{knot7}{86}
◆	\Pisymbol{knot7}{51}		\Pisymbol{knot7}{71}		\Pisymbol{knot7}{87}
●	\Pisymbol{knot7}{52}		\Pisymbol{knot7}{72}		\Pisymbol{knot7}{88}
	\Pisymbol{knot7}{53}		\Pisymbol{knot7}{73}		\Pisymbol{knot7}{96}
	\Pisymbol{knot7}{58}		\Pisymbol{knot7}{74}		\Pisymbol{knot7}{97}
	\Pisymbol{knot7}{59}		\Pisymbol{knot7}{75}		\Pisymbol{knot7}{98}
	\Pisymbol{knot7}{60}		\Pisymbol{knot7}{76}		\Pisymbol{knot7}{99}
	\Pisymbol{knot7}{61}		\Pisymbol{knot7}{77}		\Pisymbol{knot7}{100}
	\Pisymbol{knot7}{62}		\Pisymbol{knot7}{78}		\Pisymbol{knot7}{101}
	\Pisymbol{knot7}{63}		\Pisymbol{knot7}{79}		\Pisymbol{knot7}{102}
	\Pisymbol{knot7}{64}		\Pisymbol{knot7}{80}		\Pisymbol{knot7}{103}

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	\Pisymbol{knot7}{65}		\Pisymbol{knot7}{81}		\Pisymbol{knot7}{104}
	\Pisymbol{knot7}{66}		\Pisymbol{knot7}{82}		\Pisymbol{knot7}{105}
	\Pisymbol{knot7}{67}		\Pisymbol{knot7}{83}		

The following is an example of a basic knot, using `\usefont{U}{knot<number>}{m}{n}` to change fonts for multiple characters instead of `\Pisymbol` to typeset one character at a time. Note that all of the characters in the knot fonts lie conveniently within the range of printable ASCII characters.

Input	knot1	knot2	knot3	knot4	knot5	knot6	knot7
CDB							
FHG							
CEA							

The `niceframe` package can be used to typeset decorative frames using fonts such as `knot`, especially using characters 48–63 of each font variant.

TABLE 679: `dancers` Dancing Men

	\Pisymbol{dancers}{0}		\Pisymbol{dancers}{86}		\Pisymbol{dancers}{172}
	\Pisymbol{dancers}{1}		\Pisymbol{dancers}{87}		\Pisymbol{dancers}{173}
	\Pisymbol{dancers}{2}		\Pisymbol{dancers}{88}		\Pisymbol{dancers}{174}
	\Pisymbol{dancers}{3}		\Pisymbol{dancers}{89}		\Pisymbol{dancers}{175}
	\Pisymbol{dancers}{4}		\Pisymbol{dancers}{90}		\Pisymbol{dancers}{176}
	\Pisymbol{dancers}{5}		\Pisymbol{dancers}{91}		\Pisymbol{dancers}{177}
	\Pisymbol{dancers}{6}		\Pisymbol{dancers}{92}		\Pisymbol{dancers}{178}
	\Pisymbol{dancers}{7}		\Pisymbol{dancers}{93}		\Pisymbol{dancers}{179}
	\Pisymbol{dancers}{8}		\Pisymbol{dancers}{94}		\Pisymbol{dancers}{180}
	\Pisymbol{dancers}{9}		\Pisymbol{dancers}{95}		\Pisymbol{dancers}{181}
	\Pisymbol{dancers}{10}		\Pisymbol{dancers}{96}		\Pisymbol{dancers}{182}
	\Pisymbol{dancers}{11}		\Pisymbol{dancers}{97}		\Pisymbol{dancers}{183}

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\Pisymbol{dancers}{12}	\Pisymbol{dancers}{98}	\Pisymbol{dancers}{184}
\Pisymbol{dancers}{13}	\Pisymbol{dancers}{99}	\Pisymbol{dancers}{185}
\Pisymbol{dancers}{14}	\Pisymbol{dancers}{100}	\Pisymbol{dancers}{186}
\Pisymbol{dancers}{15}	\Pisymbol{dancers}{101}	\Pisymbol{dancers}{187}
\Pisymbol{dancers}{16}	\Pisymbol{dancers}{102}	\Pisymbol{dancers}{188}
\Pisymbol{dancers}{17}	\Pisymbol{dancers}{103}	\Pisymbol{dancers}{189}
\Pisymbol{dancers}{18}	\Pisymbol{dancers}{104}	\Pisymbol{dancers}{190}
\Pisymbol{dancers}{19}	\Pisymbol{dancers}{105}	\Pisymbol{dancers}{191}
\Pisymbol{dancers}{20}	\Pisymbol{dancers}{106}	\Pisymbol{dancers}{192}
\Pisymbol{dancers}{21}	\Pisymbol{dancers}{107}	\Pisymbol{dancers}{193}
\Pisymbol{dancers}{22}	\Pisymbol{dancers}{108}	\Pisymbol{dancers}{194}
\Pisymbol{dancers}{23}	\Pisymbol{dancers}{109}	\Pisymbol{dancers}{195}
\Pisymbol{dancers}{24}	\Pisymbol{dancers}{110}	\Pisymbol{dancers}{196}
\Pisymbol{dancers}{25}	\Pisymbol{dancers}{111}	\Pisymbol{dancers}{197}
\Pisymbol{dancers}{26}	\Pisymbol{dancers}{112}	\Pisymbol{dancers}{198}
\Pisymbol{dancers}{27}	\Pisymbol{dancers}{113}	\Pisymbol{dancers}{199}
\Pisymbol{dancers}{28}	\Pisymbol{dancers}{114}	\Pisymbol{dancers}{200}
\Pisymbol{dancers}{29}	\Pisymbol{dancers}{115}	\Pisymbol{dancers}{201}
\Pisymbol{dancers}{30}	\Pisymbol{dancers}{116}	\Pisymbol{dancers}{202}
\Pisymbol{dancers}{31}	\Pisymbol{dancers}{117}	\Pisymbol{dancers}{203}
\Pisymbol{dancers}{32}	\Pisymbol{dancers}{118}	\Pisymbol{dancers}{204}
\Pisymbol{dancers}{33}	\Pisymbol{dancers}{119}	\Pisymbol{dancers}{205}
\Pisymbol{dancers}{34}	\Pisymbol{dancers}{120}	\Pisymbol{dancers}{206}
\Pisymbol{dancers}{35}	\Pisymbol{dancers}{121}	\Pisymbol{dancers}{207}
\Pisymbol{dancers}{36}	\Pisymbol{dancers}{122}	\Pisymbol{dancers}{208}
\Pisymbol{dancers}{37}	\Pisymbol{dancers}{123}	\Pisymbol{dancers}{209}
\Pisymbol{dancers}{38}	\Pisymbol{dancers}{124}	\Pisymbol{dancers}{210}
\Pisymbol{dancers}{39}	\Pisymbol{dancers}{125}	\Pisymbol{dancers}{211}
\Pisymbol{dancers}{40}	\Pisymbol{dancers}{126}	\Pisymbol{dancers}{212}
\Pisymbol{dancers}{41}	\Pisymbol{dancers}{127}	\Pisymbol{dancers}{213}

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\Pisymbol{dancers}{42}	\Pisymbol{dancers}{128}	\Pisymbol{dancers}{214}
\Pisymbol{dancers}{43}	\Pisymbol{dancers}{129}	\Pisymbol{dancers}{215}
\Pisymbol{dancers}{44}	\Pisymbol{dancers}{130}	\Pisymbol{dancers}{216}
\Pisymbol{dancers}{45}	\Pisymbol{dancers}{131}	\Pisymbol{dancers}{217}
\Pisymbol{dancers}{46}	\Pisymbol{dancers}{132}	\Pisymbol{dancers}{218}
\Pisymbol{dancers}{47}	\Pisymbol{dancers}{133}	\Pisymbol{dancers}{219}
\Pisymbol{dancers}{48}	\Pisymbol{dancers}{134}	\Pisymbol{dancers}{220}
\Pisymbol{dancers}{49}	\Pisymbol{dancers}{135}	\Pisymbol{dancers}{221}
\Pisymbol{dancers}{50}	\Pisymbol{dancers}{136}	\Pisymbol{dancers}{222}
\Pisymbol{dancers}{51}	\Pisymbol{dancers}{137}	\Pisymbol{dancers}{223}
\Pisymbol{dancers}{52}	\Pisymbol{dancers}{138}	\Pisymbol{dancers}{224}
\Pisymbol{dancers}{53}	\Pisymbol{dancers}{139}	\Pisymbol{dancers}{225}
\Pisymbol{dancers}{54}	\Pisymbol{dancers}{140}	\Pisymbol{dancers}{226}
\Pisymbol{dancers}{55}	\Pisymbol{dancers}{141}	\Pisymbol{dancers}{227}
\Pisymbol{dancers}{56}	\Pisymbol{dancers}{142}	\Pisymbol{dancers}{228}
\Pisymbol{dancers}{57}	\Pisymbol{dancers}{143}	\Pisymbol{dancers}{229}
\Pisymbol{dancers}{58}	\Pisymbol{dancers}{144}	\Pisymbol{dancers}{230}
\Pisymbol{dancers}{59}	\Pisymbol{dancers}{145}	\Pisymbol{dancers}{231}
\Pisymbol{dancers}{60}	\Pisymbol{dancers}{146}	\Pisymbol{dancers}{232}
\Pisymbol{dancers}{61}	\Pisymbol{dancers}{147}	\Pisymbol{dancers}{233}
\Pisymbol{dancers}{62}	\Pisymbol{dancers}{148}	\Pisymbol{dancers}{234}
\Pisymbol{dancers}{63}	\Pisymbol{dancers}{149}	\Pisymbol{dancers}{235}
\Pisymbol{dancers}{64}	\Pisymbol{dancers}{150}	\Pisymbol{dancers}{236}
\Pisymbol{dancers}{65}	\Pisymbol{dancers}{151}	\Pisymbol{dancers}{237}
\Pisymbol{dancers}{66}	\Pisymbol{dancers}{152}	\Pisymbol{dancers}{238}
\Pisymbol{dancers}{67}	\Pisymbol{dancers}{153}	\Pisymbol{dancers}{239}
\Pisymbol{dancers}{68}	\Pisymbol{dancers}{154}	\Pisymbol{dancers}{240}
\Pisymbol{dancers}{69}	\Pisymbol{dancers}{155}	\Pisymbol{dancers}{241}
\Pisymbol{dancers}{70}	\Pisymbol{dancers}{156}	\Pisymbol{dancers}{242}
\Pisymbol{dancers}{71}	\Pisymbol{dancers}{157}	\Pisymbol{dancers}{243}

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\Pisymbol{dancers}\{72} \Pisymbol{dancers}\{158} \Pisymbol{dancers}\{244}  
\Pisymbol{dancers}\{73} \Pisymbol{dancers}\{159} \Pisymbol{dancers}\{245}  
\Pisymbol{dancers}\{74} \Pisymbol{dancers}\{160} \Pisymbol{dancers}\{246}  
\Pisymbol{dancers}\{75} \Pisymbol{dancers}\{161} \Pisymbol{dancers}\{247}  
\Pisymbol{dancers}\{76} \Pisymbol{dancers}\{162} \Pisymbol{dancers}\{248}  
\Pisymbol{dancers}\{77} \Pisymbol{dancers}\{163} \Pisymbol{dancers}\{249}  
\Pisymbol{dancers}\{78} \Pisymbol{dancers}\{164} \Pisymbol{dancers}\{250}  
\Pisymbol{dancers}\{79} \Pisymbol{dancers}\{165} \Pisymbol{dancers}\{251}  
\Pisymbol{dancers}\{80} \Pisymbol{dancers}\{166} \Pisymbol{dancers}\{252}  
\Pisymbol{dancers}\{81} \Pisymbol{dancers}\{167} \Pisymbol{dancers}\{253}  
\Pisymbol{dancers}\{82} \Pisymbol{dancers}\{168} \Pisymbol{dancers}\{254}  
\Pisymbol{dancers}\{83} \Pisymbol{dancers}\{169} \Pisymbol{dancers}\{255}  
\Pisymbol{dancers}\{84} \Pisymbol{dancers}\{170}   
\Pisymbol{dancers}\{85} \Pisymbol{dancers}\{171}

Fans of Sherlock Holmes mysteries will recognize these glyphs as forming the substitution cipher featured in Sir Arthur Conan Doyle's *The Adventure of the Dancing Men* (1903).

TABLE 680: semaphor Semaphore Alphabet

\Pisymbol{smfpr10}{34}	\Pisymbol{smfpr10}{116}	\Pisymbol{smfpr10}{184}
\Pisymbol{smfpr10}{35}	\Pisymbol{smfpr10}{117}	\Pisymbol{smfpr10}{185}
\Pisymbol{smfpr10}{36}	\Pisymbol{smfpr10}{118}	\Pisymbol{smfpr10}{186}
\Pisymbol{smfpr10}{42}	\Pisymbol{smfpr10}{119}	\Pisymbol{smfpr10}{187}
\Pisymbol{smfpr10}{46}	\Pisymbol{smfpr10}{120}	\Pisymbol{smfpr10}{192}
\Pisymbol{smfpr10}{48}	\Pisymbol{smfpr10}{121}	\Pisymbol{smfpr10}{193}
\Pisymbol{smfpr10}{49}	\Pisymbol{smfpr10}{122}	\Pisymbol{smfpr10}{194}
\Pisymbol{smfpr10}{50}	\Pisymbol{smfpr10}{126}	\Pisymbol{smfpr10}{195}
\Pisymbol{smfpr10}{51}	\Pisymbol{smfpr10}{128}	\Pisymbol{smfpr10}{196}
\Pisymbol{smfpr10}{52}	\Pisymbol{smfpr10}{129}	\Pisymbol{smfpr10}{197}
\Pisymbol{smfpr10}{53}	\Pisymbol{smfpr10}{130}	\Pisymbol{smfpr10}{199}

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\Pisymbol{smfpr10}{54}	\Pisymbol{smfpr10}{131}	\Pisymbol{smfpr10}{200}
\Pisymbol{smfpr10}{55}	\Pisymbol{smfpr10}{132}	\Pisymbol{smfpr10}{201}
\Pisymbol{smfpr10}{56}	\Pisymbol{smfpr10}{133}	\Pisymbol{smfpr10}{202}
\Pisymbol{smfpr10}{57}	\Pisymbol{smfpr10}{134}	\Pisymbol{smfpr10}{203}
\Pisymbol{smfpr10}{65}	\Pisymbol{smfpr10}{135}	\Pisymbol{smfpr10}{204}
\Pisymbol{smfpr10}{66}	\Pisymbol{smfpr10}{136}	\Pisymbol{smfpr10}{205}
\Pisymbol{smfpr10}{67}	\Pisymbol{smfpr10}{137}	\Pisymbol{smfpr10}{206}
\Pisymbol{smfpr10}{68}	\Pisymbol{smfpr10}{138}	\Pisymbol{smfpr10}{207}
\Pisymbol{smfpr10}{69}	\Pisymbol{smfpr10}{139}	\Pisymbol{smfpr10}{209}
\Pisymbol{smfpr10}{70}	\Pisymbol{smfpr10}{140}	\Pisymbol{smfpr10}{210}
\Pisymbol{smfpr10}{71}	\Pisymbol{smfpr10}{142}	\Pisymbol{smfpr10}{211}
\Pisymbol{smfpr10}{72}	\Pisymbol{smfpr10}{143}	\Pisymbol{smfpr10}{212}
\Pisymbol{smfpr10}{73}	\Pisymbol{smfpr10}{144}	\Pisymbol{smfpr10}{213}
\Pisymbol{smfpr10}{74}	\Pisymbol{smfpr10}{145}	\Pisymbol{smfpr10}{214}
\Pisymbol{smfpr10}{75}	\Pisymbol{smfpr10}{146}	\Pisymbol{smfpr10}{216}
\Pisymbol{smfpr10}{76}	\Pisymbol{smfpr10}{147}	\Pisymbol{smfpr10}{217}
\Pisymbol{smfpr10}{77}	\Pisymbol{smfpr10}{148}	\Pisymbol{smfpr10}{218}
\Pisymbol{smfpr10}{78}	\Pisymbol{smfpr10}{149}	\Pisymbol{smfpr10}{219}
\Pisymbol{smfpr10}{79}	\Pisymbol{smfpr10}{150}	\Pisymbol{smfpr10}{220}
\Pisymbol{smfpr10}{80}	\Pisymbol{smfpr10}{151}	\Pisymbol{smfpr10}{221}
\Pisymbol{smfpr10}{81}	\Pisymbol{smfpr10}{152}	\Pisymbol{smfpr10}{224}
\Pisymbol{smfpr10}{82}	\Pisymbol{smfpr10}{153}	\Pisymbol{smfpr10}{225}
\Pisymbol{smfpr10}{83}	\Pisymbol{smfpr10}{154}	\Pisymbol{smfpr10}{226}
\Pisymbol{smfpr10}{84}	\Pisymbol{smfpr10}{155}	\Pisymbol{smfpr10}{227}
\Pisymbol{smfpr10}{85}	\Pisymbol{smfpr10}{157}	\Pisymbol{smfpr10}{228}
\Pisymbol{smfpr10}{86}	\Pisymbol{smfpr10}{158}	\Pisymbol{smfpr10}{229}
\Pisymbol{smfpr10}{87}	\Pisymbol{smfpr10}{160}	\Pisymbol{smfpr10}{231}
\Pisymbol{smfpr10}{88}	\Pisymbol{smfpr10}{161}	\Pisymbol{smfpr10}{232}
\Pisymbol{smfpr10}{89}	\Pisymbol{smfpr10}{162}	\Pisymbol{smfpr10}{233}
\Pisymbol{smfpr10}{90}	\Pisymbol{smfpr10}{163}	\Pisymbol{smfpr10}{234}
\Pisymbol{smfpr10}{97}	\Pisymbol{smfpr10}{164}	\Pisymbol{smfpr10}{235}
\Pisymbol{smfpr10}{98}	\Pisymbol{smfpr10}{165}	\Pisymbol{smfpr10}{236}
\Pisymbol{smfpr10}{99}	\Pisymbol{smfpr10}{166}	\Pisymbol{smfpr10}{237}
\Pisymbol{smfpr10}{100}	\Pisymbol{smfpr10}{167}	\Pisymbol{smfpr10}{238}
\Pisymbol{smfpr10}{101}	\Pisymbol{smfpr10}{168}	\Pisymbol{smfpr10}{239}
\Pisymbol{smfpr10}{102}	\Pisymbol{smfpr10}{169}	\Pisymbol{smfpr10}{241}
\Pisymbol{smfpr10}{103}	\Pisymbol{smfpr10}{170}	\Pisymbol{smfpr10}{242}
\Pisymbol{smfpr10}{104}	\Pisymbol{smfpr10}{171}	\Pisymbol{smfpr10}{243}
\Pisymbol{smfpr10}{105}	\Pisymbol{smfpr10}{172}	\Pisymbol{smfpr10}{244}
\Pisymbol{smfpr10}{106}	\Pisymbol{smfpr10}{174}	\Pisymbol{smfpr10}{245}
\Pisymbol{smfpr10}{107}	\Pisymbol{smfpr10}{175}	\Pisymbol{smfpr10}{246}
\Pisymbol{smfpr10}{108}	\Pisymbol{smfpr10}{176}	\Pisymbol{smfpr10}{248}
\Pisymbol{smfpr10}{109}	\Pisymbol{smfpr10}{177}	\Pisymbol{smfpr10}{249}
\Pisymbol{smfpr10}{110}	\Pisymbol{smfpr10}{178}	\Pisymbol{smfpr10}{250}
\Pisymbol{smfpr10}{111}	\Pisymbol{smfpr10}{179}	\Pisymbol{smfpr10}{251}

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$\text{\Pisymbol{smfpr10}{112}}$	$\text{\Pisymbol{smfpr10}{180}}$	$\text{\Pisymbol{smfpr10}{252}}$
$\text{\Pisymbol{smfpr10}{113}}$	$\text{\Pisymbol{smfpr10}{181}}$	$\text{\Pisymbol{smfpr10}{253}}$
$\text{\Pisymbol{smfpr10}{114}}$	$\text{\Pisymbol{smfpr10}{182}}$	
$\text{\Pisymbol{smfpr10}{115}}$	$\text{\Pisymbol{smfpr10}{183}}$	

`semaphor` provides a `semaf.fd` font-definition file. Instead of using `pifont` and `\Pisymbol` to typeset a glyph, a document can select the `semaphor` fonts directly, although this does require putting `\input{semaf.fd}` in the document's preamble. For example, `\usefont{OT1}{smfp}{m}{n}Hello` will typeset “ $\text{\Pisymbol{smfp}{112}}\text{\Pisymbol{smfp}{113}}\text{\Pisymbol{smfp}{114}}\text{\Pisymbol{smfp}{115}}$ ”. This can be useful for typesetting complete messages. Roman, bold, monospace, slanted, and bold+slanted styles are all supported.

In addition, `semaphor` provides three variations of each font: a “person” version (`smfpr10`), which is what is illustrated in the preceding table, a “pillar” version (`smfr10`), which shows the flags on a pillar rather than being held by a person, and an “empty” version (`smfer10`), which shows only the flags and no pillar or person. Contrast these variations of the letter “H”:

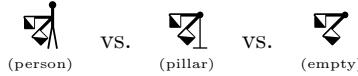


TABLE 681: lcircuit Logic Gates and VLSI Symbols

$\text{\usebox{\ande}}$	$\text{\usebox{\nfete}}$	$\text{\usebox{\ots}}$
$\text{\usebox{\andn}}$	$\text{\usebox{\nfetn}}$	$\text{\usebox{\otw}}$
$\text{\usebox{\ands}}$	$\text{\usebox{\nfets}}$	$\text{\usebox{\pfete}}$
$\text{\usebox{\andw}}$	$\text{\usebox{\nfetw}}$	$\text{\usebox{\pfetn}}$
$\text{\usebox{\capew}}$	$\text{\usebox{\nore}}$	$\text{\usebox{\pfets}}$
$\text{\usebox{\capns}}$	$\text{\usebox{\norn}}$	$\text{\usebox{\pfetw}}$
$\text{\usebox{\exore}}$	$\text{\usebox{\nors}}$	$\text{\usebox{\resew}}$
$\text{\usebox{\exorn}}$	$\text{\usebox{\norw}}$	$\text{\usebox{\resns}}$
$\text{\usebox{\exors}}$	$\text{\usebox{\note}}$	$\text{\usebox{\tgateew}}$
$\text{\usebox{\exorw}}$	$\text{\usebox{\notn}}$	$\text{\usebox{\tgatens}}$
$\text{\usebox{\nande}}$	$\text{\usebox{\nots}}$	$\text{\usebox{\tje}}$
$\text{\usebox{\nandn}}$	$\text{\usebox{\notw}}$	$\text{\usebox{\tjn}}$
$\text{\usebox{\nands}}$	$\text{\usebox{\ore}}$	$\text{\usebox{\tjs}}$

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$\square$	<code>\usebox{\nandw}</code>	$\triangleleft$	<code>\usebox{\orn}</code>	$\vdash$	<code>\usebox{\tjw}</code>
$\triangleright$	<code>\usebox{\nexore}</code>	$\triangleright$	<code>\usebox{\ors}</code>	$\vdots$	<code>\usebox{\vddpin}</code>
$\triangleleft$	<code>\usebox{\nexorn}</code>	$\triangleleft$	<code>\usebox{\orw}</code>	$\triangledown$	<code>\usebox{\vsspin}</code>
$\triangleright$	<code>\usebox{\nexors}</code>	$\triangleright$	<code>\usebox{\ote}</code>		
$\triangleleft$	<code>\usebox{\nexorw}</code>	$\triangleleft$	<code>\usebox{\otn}</code>		

Each of these symbols first must be defined via an `\input` of the corresponding `.mac` file. For example, before a document can invoke `\usebox{\nande}` it first must `\input{nande.mac}`.

All `lcircuit` symbols are defined using a LATEX `picture` environment, not a font.

TABLE 682: `cryst` Crystallography Symbols

$\circ$	<code>\Pisymbol{cryst}{0}</code>	$\blacklozenge$	<code>\Pisymbol{cryst}{63}</code>	$\swarrow$	<code>\Pisymbol{cryst}{138}</code>
$\bullet$	<code>\Pisymbol{cryst}{2}</code>	$\blacklozenge$	<code>\Pisymbol{cryst}{64}</code>	$\nwarrow$	<code>\Pisymbol{cryst}{139}</code>
$\blacktriangle$	<code>\Pisymbol{cryst}{3}</code>	$\blacktriangleleft$	<code>\Pisymbol{cryst}{65}</code>	$\blacksquare$	<code>\Pisymbol{cryst}{140}</code>
$\blacklozenge$	<code>\Pisymbol{cryst}{4}</code>	$\blacklozenge$	<code>\Pisymbol{cryst}{66}</code>	$\blacktriangleright$	<code>\Pisymbol{cryst}{141}</code>
$\rightarrow$	<code>\Pisymbol{cryst}{5}</code>	$\backslash$	<code>\Pisymbol{cryst}{75}</code>	$\blacktriangleright$	<code>\Pisymbol{cryst}{142}</code>
$\bullet$	<code>\Pisymbol{cryst}{6}</code>	$\backslash$	<code>\Pisymbol{cryst}{77}</code>	$\blacktriangleright$	<code>\Pisymbol{cryst}{143}</code>
$\rightarrow$	<code>\Pisymbol{cryst}{7}</code>	$\rightarrow$	<code>\Pisymbol{cryst}{78}</code>	$\swarrow$	<code>\Pisymbol{cryst}{145}</code>
$\rightarrow$	<code>\Pisymbol{cryst}{8}</code>	$\rightarrow$	<code>\Pisymbol{cryst}{79}</code>	$\swarrow$	<code>\Pisymbol{cryst}{147}</code>
$\rightarrow$	<code>\Pisymbol{cryst}{9}</code>	$\blacksquare$	<code>\Pisymbol{cryst}{80}</code>	$\swarrow$	<code>\Pisymbol{cryst}{148}</code>
$\circ$	<code>\Pisymbol{cryst}{10}</code>	$\blacksquare$	<code>\Pisymbol{cryst}{81}</code>	$\swarrow$	<code>\Pisymbol{cryst}{149}</code>
$\circlearrowleft$	<code>\Pisymbol{cryst}{12}</code>	$\blacksquare$	<code>\Pisymbol{cryst}{82}</code>	$\uparrow$	<code>\Pisymbol{cryst}{155}</code>
$\blacklozenge$	<code>\Pisymbol{cryst}{15}</code>	$\blacksquare$	<code>\Pisymbol{cryst}{83}</code>	$\downarrow$	<code>\Pisymbol{cryst}{157}</code>
$\bullet$	<code>\Pisymbol{cryst}{20}</code>	$\blacksquare$	<code>\Pisymbol{cryst}{84}</code>	$\downarrow$	<code>\Pisymbol{cryst}{158}</code>
$\blacktriangleleft$	<code>\Pisymbol{cryst}{21}</code>	$\backslash$	<code>\Pisymbol{cryst}{85}</code>	$\downarrow$	<code>\Pisymbol{cryst}{159}</code>
$\blacktriangleleft$	<code>\Pisymbol{cryst}{22}</code>	$\backslash$	<code>\Pisymbol{cryst}{87}</code>	$\swarrow$	<code>\Pisymbol{cryst}{175}</code>
$\blacklozenge$	<code>\Pisymbol{cryst}{24}</code>	$\backslash$	<code>\Pisymbol{cryst}{88}</code>	$\swarrow$	<code>\Pisymbol{cryst}{177}</code>
$\rightarrow$	<code>\Pisymbol{cryst}{25}</code>	$\backslash$	<code>\Pisymbol{cryst}{89}</code>	$\swarrow$	<code>\Pisymbol{cryst}{178}</code>
$\rightarrow$	<code>\Pisymbol{cryst}{27}</code>	$\backslash$	<code>\Pisymbol{cryst}{95}</code>	$\swarrow$	<code>\Pisymbol{cryst}{179}</code>
$\rightarrow$	<code>\Pisymbol{cryst}{28}</code>	$\backslash$	<code>\Pisymbol{cryst}{97}</code>	$\swarrow$	<code>\Pisymbol{cryst}{185}</code>
$\rightarrow$	<code>\Pisymbol{cryst}{29}</code>	$\backslash$	<code>\Pisymbol{cryst}{98}</code>	$\swarrow$	<code>\Pisymbol{cryst}{187}</code>
$\blacktriangleleft$	<code>\Pisymbol{cryst}{30}</code>	$\backslash$	<code>\Pisymbol{cryst}{99}</code>	$\swarrow$	<code>\Pisymbol{cryst}{188}</code>
$\blacktriangleleft$	<code>\Pisymbol{cryst}{31}</code>	$\blacktriangleleft$	<code>\Pisymbol{cryst}{102}</code>	$\swarrow$	<code>\Pisymbol{cryst}{189}</code>
$\blacktriangleleft$	<code>\Pisymbol{cryst}{32}</code>	$\blacktriangleleft$	<code>\Pisymbol{cryst}{103}</code>	$\swarrow$	<code>\Pisymbol{cryst}{195}</code>
$\rightarrow$	<code>\Pisymbol{cryst}{35}</code>	$\blacksquare$	<code>\Pisymbol{cryst}{104}</code>	$\swarrow$	<code>\Pisymbol{cryst}{197}</code>
$\bullet$	<code>\Pisymbol{cryst}{36}</code>	$\leftarrow$	<code>\Pisymbol{cryst}{105}</code>	$\swarrow$	<code>\Pisymbol{cryst}{198}</code>

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/	\Pisymbol{cryst}{37}	←	\Pisymbol{cryst}{107}	↗	\Pisymbol{cryst}{199}
↗	\Pisymbol{cryst}{38}	←	\Pisymbol{cryst}{108}	♦	\Pisymbol{cryst}{202}
↗	\Pisymbol{cryst}{39}	←	\Pisymbol{cryst}{109}	☒	\Pisymbol{cryst}{203}
◆	\Pisymbol{cryst}{40}	❖	\Pisymbol{cryst}{112}	▬	\Pisymbol{cryst}{204}
◆	\Pisymbol{cryst}{41}	☒	\Pisymbol{cryst}{113}	◊	\Pisymbol{cryst}{210}
◆	\Pisymbol{cryst}{42}	❖	\Pisymbol{cryst}{120}	❖	\Pisymbol{cryst}{212}
◆	\Pisymbol{cryst}{43}	❖	\Pisymbol{cryst}{121}	☒	\Pisymbol{cryst}{213}
■	\Pisymbol{cryst}{44}	☒	\Pisymbol{cryst}{123}	♦	\Pisymbol{cryst}{220}
/	\Pisymbol{cryst}{45}	▀	\Pisymbol{cryst}{124}	❖	\Pisymbol{cryst}{221}
/	\Pisymbol{cryst}{47}	✓	\Pisymbol{cryst}{125}	☒	\Pisymbol{cryst}{223}
/	\Pisymbol{cryst}{48}	✓	\Pisymbol{cryst}{127}	▬	\Pisymbol{cryst}{224}
/	\Pisymbol{cryst}{49}	◀	\Pisymbol{cryst}{128}	♂	\Pisymbol{cryst}{230}
◆	\Pisymbol{cryst}{50}	◀	\Pisymbol{cryst}{129}	☒	\Pisymbol{cryst}{231}
↑	\Pisymbol{cryst}{55}	☒	\Pisymbol{cryst}{130}	❖	\Pisymbol{cryst}{232}
↑	\Pisymbol{cryst}{57}	☒	\Pisymbol{cryst}{131}	☒	\Pisymbol{cryst}{233}
↑	\Pisymbol{cryst}{58}	☒	\Pisymbol{cryst}{132}	❖	\Pisymbol{cryst}{236}
↑	\Pisymbol{cryst}{59}	☒	\Pisymbol{cryst}{133}	◊	\Pisymbol{cryst}{240}
◆	\Pisymbol{cryst}{60}	✓	\Pisymbol{cryst}{135}	▬	\Pisymbol{cryst}{241}
❖	\Pisymbol{cryst}{61}	☒	\Pisymbol{cryst}{136}	▀	\Pisymbol{cryst}{242}
❖	\Pisymbol{cryst}{62}	✓	\Pisymbol{cryst}{137}	▬	\Pisymbol{cryst}{243}

TABLE 683: dice Dice

□ \Pisymbol{dice3d}{49}	⚁ \Pisymbol{dice3d}{101}	⚂ \Pisymbol{dice3d}{111}
⚂ \Pisymbol{dice3d}{50}	⚃ \Pisymbol{dice3d}{102}	⚄ \Pisymbol{dice3d}{112}
⚃ \Pisymbol{dice3d}{51}	⚅ \Pisymbol{dice3d}{103}	⚅ \Pisymbol{dice3d}{113}
⚄ \Pisymbol{dice3d}{52}	⚄ \Pisymbol{dice3d}{104}	⚃ \Pisymbol{dice3d}{114}
⚅ \Pisymbol{dice3d}{53}	⚁ \Pisymbol{dice3d}{105}	⚁ \Pisymbol{dice3d}{115}
⚃ \Pisymbol{dice3d}{54}	⚂ \Pisymbol{dice3d}{106}	⚂ \Pisymbol{dice3d}{116}
⚄ \Pisymbol{dice3d}{97}	⚃ \Pisymbol{dice3d}{107}	⚃ \Pisymbol{dice3d}{117}
⚅ \Pisymbol{dice3d}{98}	⚅ \Pisymbol{dice3d}{108}	⚅ \Pisymbol{dice3d}{118}
⚃ \Pisymbol{dice3d}{99}	⚄ \Pisymbol{dice3d}{109}	⚄ \Pisymbol{dice3d}{119}
⚄ \Pisymbol{dice3d}{100}	⚁ \Pisymbol{dice3d}{110}	⚁ \Pisymbol{dice3d}{120}

`dice` defines its symbols at a very small design size. The glyphs shown above were scaled up by a factor of four using `\DeclareFontShape{U}{dice3d}{m}{n}{<->s*[4] dice3d}{}`.

An alternative to using `\Pisymbol` to select a die rotation is to rely on some cleverness in the kerning tables provided by the `dice` font. The individual digits “1” through “6” each produce the corresponding (2D) die face: `{\usefont{U}{dice3d}{m}{n}2 2 1}` produces “⚁ ⚁ ⚂”, for example. When followed by a letter “a” through “d”, those pairs are kerned to produce a 3D die rotation with the digit specifying by the top face and the letter specifying one of the four possible front faces, sorted by increasing value. For example, `{\usefont{U}{dice3d}{m}{n}2a 2b 1d}` produces “⚁ ⚁ ⚃ ⚄”.

TABLE 684: figbas Figured-Bass Ligatures

4 \Pisymbol{figbas}{50}	6 \Pisymbol{figbas}{54}
4 \Pisymbol{figbas}{52}	9 \Pisymbol{figbas}{57}
5 \Pisymbol{figbas}{53}	

Shown here are the figured-bass ligatures based on Computer Modern. `figbas` additionally provides versions of these symbols based on Computer Modern Sans and Palatino/Palladio.

`{\usefont{U}{figbas}{m}{n}2 4 5 6 9}` is an equivalent means of producing these symbols.

TABLE 685: magic Trading Card Symbols

⓪	\Pisymbol{magic}{48}	⑥	\Pisymbol{magic}{54}	⌚	\Pisymbol{magic}{82}
①	\Pisymbol{magic}{49}	⑦	\Pisymbol{magic}{55}	⊗	\Pisymbol{magic}{84}
②	\Pisymbol{magic}{50}	⑧	\Pisymbol{magic}{56}	💧	\Pisymbol{magic}{85}
③	\Pisymbol{magic}{51}	⑨	\Pisymbol{magic}{57}	⌚	\Pisymbol{magic}{87}
④	\Pisymbol{magic}{52}	💀	\Pisymbol{magic}{66}	⊗	\Pisymbol{magic}{88}
⑤	\Pisymbol{magic}{53}	⌚	\Pisymbol{magic}{71}	ⓩ	\Pisymbol{magic}{90}

The preceding symbols resemble those from Wizards of the Coast's *Magic: The Gathering* trading-card game. An alternative to entering symbols numerically using \Pisymbol is to switch to the `magic` font with \usefont{U}{magic}{m}{n} and employ the following mnemonic characters:

⓪–⓯	0–9	Circled numerals 0–9
💀	B	Black magic symbol
:green:	G	Green magic symbol
⌚	R	Red magic symbol
⊗	T	Tap symbol (tilted “T” in a circle)
💧	U	Blue magic symbol
⌚	W	White magic symbol
⊗	X	Circled “X” (for mana cost, e.g., Fireball)
ⓩ	Z	Circled “10” (for mana cost, e.g., Aladdin’s Lamp)

TABLE 686: bartel-chess-fonts Chess Pieces and Chessboard Squares

♙	\Pisymbol{fselch}{0}	♕	\Pisymbol{fselch}{55}	♝	\Pisymbol{fselch}{110}
♘	\Pisymbol{fselch}{1}	♔	\Pisymbol{fselch}{56}	♞	\Pisymbol{fselch}{111}
♗	\Pisymbol{fselch}{2}	♚	\Pisymbol{fselch}{57}	♜	\Pisymbol{fselch}{112}
♖	\Pisymbol{fselch}{3}	♝	\Pisymbol{fselch}{58}	♝	\Pisymbol{fselch}{113}
♛	\Pisymbol{fselch}{4}	♞	\Pisymbol{fselch}{59}	♞	\Pisymbol{fselch}{114}
♚	\Pisymbol{fselch}{5}	♜	\Pisymbol{fselch}{60}	♜	\Pisymbol{fselch}{115}
♝	\Pisymbol{fselch}{6}	♝	\Pisymbol{fselch}{61}	♞	\Pisymbol{fselch}{116}
♞	\Pisymbol{fselch}{7}	♞	\Pisymbol{fselch}{62}	♜	\Pisymbol{fselch}{117}
♜	\Pisymbol{fselch}{8}	♜	\Pisymbol{fselch}{63}	♝	\Pisymbol{fselch}{118}
♝	\Pisymbol{fselch}{9}	♝	\Pisymbol{fselch}{64}	♞	\Pisymbol{fselch}{119}
♞	\Pisymbol{fselch}{10}	♞	\Pisymbol{fselch}{65}	♜	\Pisymbol{fselch}{120}
♚	\Pisymbol{fselch}{11}	♜	\Pisymbol{fselch}{66}	♝	\Pisymbol{fselch}{121}
♙	\Pisymbol{fselch}{12}	♝	\Pisymbol{fselch}{67}	♞	\Pisymbol{fselch}{122}

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♞	\Pisymbol{fselch}{13}	♚	\Pisymbol{fselch}{68}	♝	\Pisymbol{fselch}{123}
♝	\Pisymbol{fselch}{14}	♛	\Pisymbol{fselch}{69}	♜	\Pisymbol{fselch}{124}
♜	\Pisymbol{fselch}{15}	♝	\Pisymbol{fselch}{70}	♣	\Pisymbol{fselch}{125}
♚	\Pisymbol{fselch}{16}	♛	\Pisymbol{fselch}{71}	♝	\Pisymbol{fselch}{126}
♝	\Pisymbol{fselch}{17}	♜	\Pisymbol{fselch}{72}	♛	\Pisymbol{fselch}{127}
♜	\Pisymbol{fselch}{18}	♝	\Pisymbol{fselch}{73}	♝	\Pisymbol{fselch}{128}
♝	\Pisymbol{fselch}{19}	♜	\Pisymbol{fselch}{74}	♜	\Pisymbol{fselch}{129}
♜	\Pisymbol{fselch}{20}	♝	\Pisymbol{fselch}{75}	♝	\Pisymbol{fselch}{130}
♝	\Pisymbol{fselch}{21}	♜	\Pisymbol{fselch}{76}	♞	\Pisymbol{fselch}{131}
♞	\Pisymbol{fselch}{22}	♝	\Pisymbol{fselch}{77}	♚	\Pisymbol{fselch}{132}
♚	\Pisymbol{fselch}{23}	♛	\Pisymbol{fselch}{78}	♝	\Pisymbol{fselch}{133}
♝	\Pisymbol{fselch}{24}	♜	\Pisymbol{fselch}{79}	♛	\Pisymbol{fselch}{134}
♜	\Pisymbol{fselch}{25}	♝	\Pisymbol{fselch}{80}	♝	\Pisymbol{fselch}{135}
♝	\Pisymbol{fselch}{26}	♜	\Pisymbol{fselch}{81}	♞	\Pisymbol{fselch}{136}
♞	\Pisymbol{fselch}{27}	♝	\Pisymbol{fselch}{82}	♝	\Pisymbol{fselch}{137}
♚	\Pisymbol{fselch}{28}	♝	\Pisymbol{fselch}{83}	♝	\Pisymbol{fselch}{138}
♝	\Pisymbol{fselch}{29}	♛	\Pisymbol{fselch}{84}	♛	\Pisymbol{fselch}{139}
♞	\Pisymbol{fselch}{30}	♝	\Pisymbol{fselch}{85}	♝	\Pisymbol{fselch}{140}
♞	\Pisymbol{fselch}{31}	♝	\Pisymbol{fselch}{86}	♞	\Pisymbol{fselch}{141}
♚	\Pisymbol{fselch}{32}	♞	\Pisymbol{fselch}{87}	♞	\Pisymbol{fselch}{142}
♝	\Pisymbol{fselch}{33}	♝	\Pisymbol{fselch}{88}	♝	\Pisymbol{fselch}{143}
♞	\Pisymbol{fselch}{34}	♝	\Pisymbol{fselch}{89}	♝	\Pisymbol{fselch}{144}
♚	\Pisymbol{fselch}{35}	♞	\Pisymbol{fselch}{90}	○	\Pisymbol{fselch}{145}
♝	\Pisymbol{fselch}{36}	♝	\Pisymbol{fselch}{91}	●	\Pisymbol{fselch}{151}
♞	\Pisymbol{fselch}{37}	♝	\Pisymbol{fselch}{92}	○	\Pisymbol{fselch}{157}
♝	\Pisymbol{fselch}{38}	♞	\Pisymbol{fselch}{93}	○	\Pisymbol{fselch}{163}
♞	\Pisymbol{fselch}{39}	♝	\Pisymbol{fselch}{94}	●	\Pisymbol{fselch}{169}
♚	\Pisymbol{fselch}{40}	♝	\Pisymbol{fselch}{95}	●	\Pisymbol{fselch}{175}
♝	\Pisymbol{fselch}{41}	♞	\Pisymbol{fselch}{96}	☒	\Pisymbol{fselch}{180}
♞	\Pisymbol{fselch}{42}	♝	\Pisymbol{fselch}{97}	☒	\Pisymbol{fselch}{186}
♞	\Pisymbol{fselch}{43}	♝	\Pisymbol{fselch}{98}	☒	\Pisymbol{fselch}{192}
♝	\Pisymbol{fselch}{44}	♞	\Pisymbol{fselch}{99}	☒	\Pisymbol{fselch}{198}
♞	\Pisymbol{fselch}{45}	♝	\Pisymbol{fselch}{100}	☒	\Pisymbol{fselch}{204}
♚	\Pisymbol{fselch}{46}	♝	\Pisymbol{fselch}{101}	☒	\Pisymbol{fselch}{210}
♝	\Pisymbol{fselch}{47}	♞	\Pisymbol{fselch}{102}	☒	\Pisymbol{fselch}{216}
♞	\Pisymbol{fselch}{48}	♝	\Pisymbol{fselch}{103}	☒	\Pisymbol{fselch}{222}
♞	\Pisymbol{fselch}{49}	♝	\Pisymbol{fselch}{104}	☒	\Pisymbol{fselch}{228}
♝	\Pisymbol{fselch}{50}	♞	\Pisymbol{fselch}{105}	☒	\Pisymbol{fselch}{234}
♞	\Pisymbol{fselch}{51}	♝	\Pisymbol{fselch}{106}	☒	\Pisymbol{fselch}{240}
♝	\Pisymbol{fselch}{52}	♝	\Pisymbol{fselch}{107}	☒	\Pisymbol{fselch}{246}

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¶ \Pisymbol{fselch}{53} ☐ \Pisymbol{fselch}{108}  
¤ \Pisymbol{fselch}{54} ☕ \Pisymbol{fselch}{109}

In addition to the `fselch` font showcased above, `bartel-chess-fonts` also provides a `pkelch` font which includes the same symbol set (minus some of the higher-numbered characters) but drawn in a slightly different style.

`bartel-chess-fonts` provides the `fselch` and `pkelch` fonts in various sizes (optically scaled). See “`LATEX 2 $\varepsilon$  Font Selection`” [LAT19] for advice on how to expose these sorts of fonts to `LATEX` using `\DeclareFontFamily` and `\DeclareFontShape`.

# Chapter 12

## Additional Information

Unlike the previous chapters of this document, Chapter 12 does not contain new symbol tables. Rather, it provides additional help in using the Comprehensive L<sup>A</sup>T<sub>E</sub>X Symbol List. First, it draws attention to symbol names used by multiple packages. Next, it provides some guidelines for finding symbols and gives some examples regarding how to construct missing symbols out of existing ones. Then, it comments on the spacing surrounding symbols in math mode. After that, it presents an ASCII and Latin 1 quick-reference guide, showing how to enter all of the standard ASCII/Latin 1 symbols in L<sup>A</sup>T<sub>E</sub>X. And finally, it lists some statistics about this document itself.

### 12.1 Symbol Name Clashes

Unfortunately, a number of symbol names are not unique; they appear in more than one package. Depending on how the symbols are defined in each package, L<sup>A</sup>T<sub>E</sub>X will either output an error message or replace an earlier-defined symbol with a later-defined symbol. Table 687 on page 365 presents a selection of name clashes that appear in this document.

Using multiple symbols with the same name in the same document—or even merely loading conflicting symbol packages—can be tricky but, as evidenced by the existence of Table 687, not impossible. The general procedure is to load the first package, rename the conflicting symbols, and then load the second package. Examine the L<sup>A</sup>T<sub>E</sub>X source for this document (`symbols.tex`) for examples of this and other techniques for handling symbol conflicts. Note that `symbols.tex`'s `\savesymbol` and `\restoresymbol` macros have been extracted into the `savesym` package, which can be downloaded from CTAN.

`txfonts` and `pxfonts` redefine a huge number of symbols—essentially, all of the symbols defined by `latexsym`, `textcomp`, the various  $\mathcal{MS}$  symbol sets, and L<sup>A</sup>T<sub>E</sub>X 2 <sub>$\varepsilon$</sub>  itself. Similarly, `mathabx` redefines a vast number of math symbols in an attempt to improve their look. The `txfonts`, `pxfonts`, and `mathabx` conflicts are not listed in Table 687 because they are designed to be compatible with the symbols they replace. Table 688 on page 366 illustrates what “compatible” means in this context.

To use the new `txfonts/pxfonts` symbols without altering the document's main font, merely reset the default font families back to their original values after loading one of those packages:

```
\renewcommand\rmdefault{cmr}
\renewcommand\sfdefault{cmss}
\renewcommand\ttdefault{cmtt}
```

TABLE 687: Symbol Name Clashes

Symbol	$\text{\LaTeX}\ 2\varepsilon$	$\mathcal{M}$	stmaryrd	wasysym	mathabx	marvosym	bding	ifsym	dingbat	wsipa
$\backslash\baro$			$\phi$							$\Theta$
$\backslash\bigtriangledown$	$\nabla$		$\nabla$							
$\backslash\bigtriangleup$	$\Delta$		$\Delta$							
$\backslash\checkmark$		✓							✓	
$\backslash\Circle$				○				○		
$\backslash\Cross$						†	†	×		
$\backslash\ggg$	»»				»					⊗
$\backslash\Letter$						⊗				⊗
$\backslash\lightning$			⚡	⚡						
$\backslash\Lightning$						⚡		⚡		
$\backslash\lll$	»»				««					
$\backslash\Square$				□			□	□		
$\backslash\Sun$					○	○			○	
$\backslash\TriangleDown$							▼		▽	
$\backslash\TriangleUp$							▲		△	

TABLE 688: Example of a Benign Name Clash

Symbol	Default (Computer Modern)	<code>txfonts</code> (Times Roman)
<code>R</code>	R	R
<code>\textrecipe</code>	R	R

## 12.2 Resizing symbols

Mathematical symbols listed in this document as “variable-sized” are designed to stretch vertically. Each variable-sized symbol comes in one or more basic sizes plus a variation comprising both stretchable and nonstretchable segments. Table 689 on page 366 presents the symbols `\}` and `\uparrow` in their default size, in their `\big`, `\Big`, `\bigg`, and `\Bigg` sizes, in an even larger size achieved using `\left/\right`, and—for contrast—in a large size achieved by changing the font size using L<sup>A</sup>T<sub>E</sub>X 2<sub>&</sub>’s `\fontsize` command. Because the symbols shown belong to the Computer Modern family, the `type1cm` package needs to be loaded to support font sizes larger than 24.88 pt.

TABLE 689: Sample resized delimiters

Symbol	Default size	<code>\big</code>	<code>\Big</code>	<code>\bigg</code>	<code>\Bigg</code>	<code>\left/\right</code>	<code>\fontsize</code>
<code>\}</code>	}	}	}	}	}	{	}
<code>\uparrow</code>	↑	↑	↑	↑	↑	↑	↑

Note how `\fontsize` makes the symbol wider and thicker. (The `graphicx` package’s `\scalebox` or `\resizebox` commands would produce a similar effect.) Also, the `\fontsize`-enlarged symbol is vertically centered relative to correspondingly large text, unlike the symbols enlarged using `\big` et al. or `\left/` `\right`, which all use the same math axis regardless of symbol size. However, `\fontsize` is not limited to mathematical delimiters. Also, `\scalebox` and `\resizebox` are more robust to poorly composed symbols (e.g., two symbols made to overlap by backspacing a fixed distance) but do not work with every T<sub>E</sub>X backend and will produce jagged symbols when scaling a bitmapped font.

All variable-sized delimiters are defined (by the corresponding `.tfm` file) in terms of up to five segments, as illustrated by Figure 12.1 on the following page. The top, middle, and bottom segments are of a fixed size.

The top-middle and middle-bottom segments (which are constrained to be the same character) are repeated as many times as necessary to achieve the desired height.

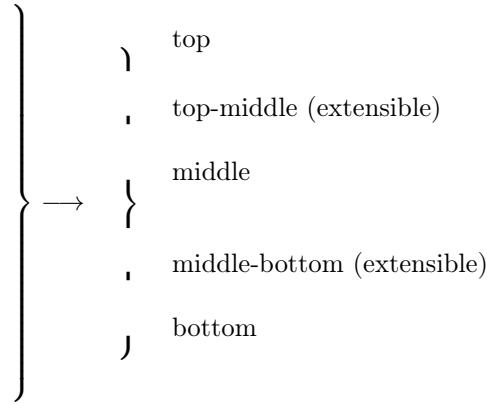


Figure 12.1: Implementation of variable-sized delimiters

### 12.3 Where can I find the symbol for ...?

If you can't find some symbol you're looking for in this document, there are a few possible explanations:

- The symbol isn't intuitively named. As a few examples, the `ifsym` command to draw dice is “`\Cube`”; a plus sign with a circle around it (“exclusive or” to computer engineers) is “`\oplus`”; and lightning bolts in fonts designed by German speakers may have “blitz” in their names as in the `wasy` package. The moral of the story is to be creative with synonyms when searching the index.
- The symbol is defined by some package that I overlooked (or deemed unimportant). If there's some symbol package that you think should be included in the Comprehensive L<sup>A</sup>T<sub>E</sub>X Symbol List, please send me e-mail at the address listed on the title page.
- The symbol isn't defined in any package whatsoever.

Even in the last case, all is not lost. Sometimes, a symbol exists in a font, but there is no L<sup>A</sup>T<sub>E</sub>X binding for it. For example, the PostScript Symbol font contains a “J” symbol, which may be useful for representing a carriage return, but there is no package (as far as I know) for accessing that symbol. To produce an unnamed symbol, you need to switch to the font explicitly with L<sup>A</sup>T<sub>E</sub>X 2 <sub>$\varepsilon$</sub> 's low-level font commands [LAT19] and use T<sub>E</sub>X's primitive `\char` command [Knu86a] to request a specific character number in the font. For example, one can define a command to typeset a long s (“f”) using character 115 from the Latin Modern fonts in the TS1 font encoding:<sup>1</sup>

```
\newcommand{\textlongs}{{%
  \fontencoding{TS1}\fontfamily{lmr}\selectfont\char115%
}}
```

Then, “`\textlongs ucce\textlongs sful`” will produce “successful”—in the current font style (roman, italic, bold, etc.)

In fact, `\char` is not strictly necessary in all cases; the character can often be entered symbolically. For example, the symbol for an impulse train or Tate-Shafarevich group (“III”) is actually an uppercase *sha* in

---

<sup>1</sup>Since January 2020, the `wasy` package provides a `\longs` symbol. See Table 48.

the Cyrillic alphabet. (Cyrillic is supported by the OT2 font encoding, for instance). While a *sha* can be defined numerically as “{\fontencoding{OT2}\selectfont\char88}” it may be more intuitive to use the OT2 font encoding’s “SH” ligature: “{\fontencoding{OT2}\selectfont SH}”. Another possibility is to use the T2A font encoding’s \CYRSH command: “{\fontencoding{T2A}\selectfont\CYRSH}”.

For the specific case of the U font encoding, which is used for symbol or “pi” fonts, the pifont package defines a convenient \Pisymbol command. \Pisymbol typesets a specified character (by number) in a specified font family. For example, “\Pisymbol{psy}{191}” produces the aforementioned “ $\lrcorner$ ” symbol by typesetting character number 191 in the psy (PostScript Symbol) font family.

### 12.3.1 Reflecting and rotating existing symbols

A common request on `comp.text.tex` is for a reversed or rotated version of an existing symbol. As a last resort, these effects can be achieved with the `graphicx` (or `graphics`) package’s `\reflectbox` and `\rotatebox` macros. For example, `\textsuperscript{\reflectbox{?}}` produces an irony mark (“ $\text{?}$ ”), and `\rotatebox[origin=c]{180}{$\iota$}` produces the definite-description operator (“ $\iota$ ”). As noted by Marc Olschok in a July 2011 post on `comp.text.tex`, Project Gutenberg uses `\reflectbox` to typeset the part (“3”) and whole (“ $\varepsilon$ ”) relations used in Dedekind’s set notation:

```
\newcommand\partof{\mathrel{\raisebox{0.45ex}{$\scriptstyle\mathfrak{3}$}}}
\newcommand\wholeof{\mathrel{\reflectbox{$\scriptstyle\mathfrak{3}$}}}
```

The disadvantage of the `graphicx`/`graphics` approach is that not every `TeX` backend handles graphical transformations.<sup>2</sup> Far better is to find a suitable font that contains the desired symbol in the correct orientation. For instance, if the phonetic package is available, then `\textit{\riota}` will yield a backend-independent “ $\iota$ ”. Similarly, tipa’s `\textrevespsilon` (“3”) or wsipa’s `\revepsilon` (“3”) may be used to express the mathematical notion of “such that” in a cleaner manner than with `\reflectbox` or `\rotatebox`.<sup>3</sup>

### 12.3.2 Joining and overlapping existing symbols

Symbols that do not exist in any font can sometimes be fabricated out of existing symbols. The  $\text{\LaTeX} 2_{\varepsilon}$  source file `fontdef.dtx` contains a number of such definitions. For example, `\models` (see Table 98 on page 67) is defined in that file with:

```
\def\models{\mathrel|\joinrel=}
```

where `\mathrel` and `\joinrel` are used to control the horizontal spacing. `\def` is the `TeX` primitive upon which `\newcommand` is based. See The `TeXbook` [Knu86a] for more information on all three of those commands.

With some simple pattern-matching, one can easily define a backward `\models` sign (“ $=|$ ”):

```
\def\ismodeledby{=\joinrel\mathrel|}
```

In general, arrows/harpoons, horizontal lines (“=”, “-”, “\relbar”, and “\Relbar”), and the various math-extension characters can be combined creatively with miscellaneous other characters to produce a variety of new symbols. Of course, new symbols can be composed from *any* set of existing characters. For instance, `\hbar` (“ $\hbar$ ”) as a “-” character (`\mathchar'26`) followed by a backspace of 9 math units (`\mkern-9mu`), followed by the letter “ $h$ ”:

```
\def\hbar{\{\mathchar'26\mkern-9mu h\}}
```

<sup>2</sup>As an example, Xdvi ignores both `\reflectbox` and `\rotatebox`.

<sup>3</sup>More common symbols for representing “such that” include “|”, “:”, and “s.t.”.

We can just as easily define other barred letters:

```
\def\bbar{{\mathchar'26\mkern-9mu b}}
\def\dbar{{\mathchar'26\mkern-12mu d}}
```

(The space after the “mu” is optional but is added for clarity.) `\bbar` and `\dbar` define “ $\bar{b}$ ” and “ $\bar{d}$ ”, respectively. Note that `\dbar` requires a greater backward math kern than `\bbar`; a  $-9\mu\text{m}$  kern would have produced the less-attractive “ $\bar{\bar{d}}$ ” glyph.

The `amsmath` package provides `\overset` and `\underset` commands for placing one symbol respectively above or below another. For example, `\overset{G}{\sim}`<sup>4</sup> produces “ $\overset{G}{\sim}$ ” (sometimes used for “equidecomposable with respect to  $G$ ”).

Sometimes an ordinary `tabular` environment can be co-opted into juxtaposing existing symbols into a new symbol. Consider the following definition of `\asterism` (“ $\ast$ ”) from a June 2007 post to `comp.text.tex` by Peter Flynn:

```
\newcommand{\asterism}{\smash{%
  \raisebox{-.5ex}{%
    \setlength{\tabcolsep}{-.5pt}%
    \begin{tabular}{@{}cc@{}}
      \multicolumn{2}{c}{\vphantom{\bigg|}\!\!\![-2ex]*&*}%
    \end{tabular}}}}
```

Note how the space between columns (`\tabcolsep`) and rows (`\vphantom{\bigg|}\!\!\![-2ex]*&*`) is made negative to squeeze the asterisks closer together.

There is a `TEX` primitive called `\mathaccnt` that centers one mathematical symbol atop another. For example, one can define `\dotcup` (“ $\cup$ ”—the composition of a `\cup` and a `\cdot`)—as follows:

```
\newcommand{\dotcup}{\ensuremath{\mathaccnt{\cdot}{\cup}}}
```

The catch is that `\mathaccnt` requires the accent to be a “math character”. That is, it must be a character in a math font as opposed to a symbol defined in terms of other symbols. See The `TEXbook` [Knu86a] for more information.

Another `TEX` primitive that is useful for composing symbols is `\vcenter`. `\vcenter` is conceptually similar to “`\begin{tabular}{1}`” in `LATEX` but takes a list of vertical material instead of `\v`-separated rows. Also, it vertically centers the result on the math axis. (Many operators, such as  $+$  and  $-$  are also vertically centered on the math axis.) Enrico Gregorio posted the following symbol definition to `comp.text.tex` in March 2004 in response to a query about an alternate way to denote equivalence:

```
\newcommand*\threesim{%
  \mathrel{\vcenter{\offinterlineskip
    \hbox{$\sim$}\vskip-.35ex\hbox{$\sim$}\vskip-.35ex\hbox{$\sim$}}}}
```

The `\threesim` symbol, which vertically centers three `\sim` (“ $\sim$ ”) symbols with  $0.35x$ -heights of space between them, is rendered as “ $\approx$ ”. `\offinterlineskip` is a macro that disables implicit interline spacing. Without it, `\threesim` would have a full line of vertical spacing between each `\sim`. Because of `\vcenter`, `\threesim` aligns properly with other math operators:  $a \div b \approx c \times d$ .

A related `LATEX` command, borrowed from Plain `TEX`, is `\ooalign`. `\ooalign` vertically overlaps symbols and works both within and outside of math mode. Essentially, it creates a single-column `tabular` environment with zero vertical distance between rows. However, because it is based directly on `TEX`’s `\ialign`

---

<sup>4</sup>`LATEX`’s `\stackrel` command is similar but is limited to placing a symbol above a binary relation.

primitive, `\ooalign` uses TeX’s tabular syntax instead of L<sup>A</sup>T<sub>E</sub>X’s (i.e., with `\cr` as the row terminator instead of `\\"`). The following example of `\ooalign`, a macro that defines a standard-state symbol (`\stst`, “ $\circ$ ”) as a superscripted Plimsoll line (`\barcirc`, “ $\circ$ ”),<sup>5</sup> is due to an October 2007 `comp.text.tex` post by Donald Arseneau:

```
\makeatletter
\providedeclaration\barcirc{\mathpalette\@barred\circ}
\def\@barred#1#2{\ooalign{\hfil$#1-$\hfil\cr\hfil$#1#2$\hfil\cr}}
\newcommand\stst{\^{\protect\barcirc}}
\makeatother
```

In the preceding code, note the `\ooalign` call’s use of `\hfil` to horizontally center a minus sign (“ $-$ ”) and a `\circ` (“ $\circ$ ”).

As another example of `\ooalign`, consider the following code (due to Enrico Gregorio in a June 2007 post to `comp.text.tex`) that overlaps a `\ni` (“ $\ni$ ”) and two minus signs (“ $-$ ”) to produce “ $\ni$ ”, an obscure variation on the infrequently used “ $3$ ” symbol for “such that” discussed on page 368:

```
\newcommand{\suchthat}{%
\mathrel{\ooalign{\ni$\cr\kern-1pt$-$\kern-6.5pt$-$}}}
```

The `slashed` package, although originally designed for producing Feynman slashed-character notation, in fact facilitates the production of *arbitrary* overlapped symbols. The default behavior is to overwrite a given character with “/”. For example, `\slashed{D}` produces “ $D$ ”. However, the `\declaresslashed` command provides the flexibility to specify the mathematical context of the composite character (operator, relation, punctuation, etc., as will be discussed in Section 12.4), the overlapping symbol, horizontal and vertical adjustments in symbol-relative units, and the character to be overlapped. Consider, for example, the symbol for reduced quadrupole moment (“ $I$ ”). This can be declared as follows:

```
\newcommand{\rqm}{%
\declaresslashed{}{\text{-}}{0.04}{0}{I}\slashed{I}}
```

`\declaresslashed{·}{·}{·}{·}{I}` affects the meaning of all subsequent `\slashed{I}` commands in the same scope. The preceding definition of `\rqm` therefore uses an extra set of curly braces to limit that scope to a single `\slashed{I}`. In addition, `\rqm` uses `amstext`’s `\text` macro (described on page 372) to make `\declaresslashed` use a text-mode hyphen (“ $-$ ”) instead of a math-mode minus sign (“ $-$ ”) and to ensure that the hyphen scales properly in size in subscripts and superscripts. See `slashed`’s documentation (located in `slashed.sty` itself) for a detailed usage description of the `\slashed` and `\declaresslashed` commands.

Somewhat simpler than `slashed` is the `centernot` package. `centernot` provides a single command, `\centernot`, which, like `\not`, puts a slash over the subsequent mathematical symbol. However, instead of putting the slash at a fixed location, `\centernot` centers the slash over its argument. `\centernot` might be used, for example, to create a “does not imply” symbol:

$\not\Rightarrow$	<code>\not\Rightarrow</code>	<code>\not\Longrightarrow</code>
vs.		
$\not\Rightarrow$	<code>\centernot\Rightarrow</code>	<code>\centernot\Longrightarrow</code>

See the `centernot` documentation for more information.

<sup>5</sup>While `\barcirc` illustrates how to combine symbols using `\ooalign`, the `plimsoll` package’s `\plimsoll` command (Table 353 on page 165) and the `stmaryrd` package’s `\minuso` command (Table 55 on page 38) provide a similar glyph (ø) as a single, indivisible symbol.

### 12.3.3 Making new symbols work in superscripts and subscripts

To make composite symbols work properly within subscripts and superscripts, you may need to use TeX's `\mathchoice` primitive. `\mathchoice` evaluates one of four expressions, based on whether the current math style is display, text, script, or scriptscript. (See The TeXbook [Knu86a] for a more complete description.) For example, the following L<sup>A</sup>T<sub>E</sub>X code—posted to `comp.text.tex` by Torsten Bronger—composes a sub/superscriptable “ $\top$ ” symbol out of `\top` and `\bot` (“ $\top$ ” and “ $\bot$ ”):

```
\def\topbotatom{\hbox{\hbox to 0pt{\$#1\bot\$hss\$#1\top\$}}}
\newcommand*\topbot{\mathrel{\mathchoice{\topbotatom\displaystyle}{\topbotatom\textstyle}{\topbotatom\scriptstyle}{\topbotatom\scriptscriptstyle}}}
```

The following is another example that uses `\mathchoice` to construct symbols in different math modes. The code defines a principal value integral symbol, which is an integral sign with a line through it.

```
\def\Xint#1{\mathchoice
  {\XXint\displaystyle\textstyle{#1}}%
  {\XXint\textstyle\scriptstyle{#1}}%
  {\XXint\scriptstyle\scriptscriptstyle{#1}}%
  {\XXint\scriptscriptstyle\scriptscriptstyle{#1}}%
  \!\!{}_{\int}^{\!{}_{\int}}}
\def\XXint#1#2#3{{\setbox0=\hbox{\#1\#2\#3}\int\kern-.5\wd0}}
\def\ddashint{\Xint=}
\def\dashint{\Xint-}
```

(The preceding code was taken verbatim from <http://www.texfaq.org/FAQ-prinvalint.html>.) `\dashint` produces a single-dashed integral sign (“ $\int$ ”), while `\ddashint` produces a double-dashed one (“ $\int\int$ ”). The `\Xint` macro defined above can also be used to generate a wealth of new integrals: “ $\oint$ ” (`\Xint\circlearrowright`), “ $\oint$ ” (`\Xint\circlearrowleft`), “ $\oint$ ” (`\Xint\subset`), “ $\oint$ ” (`\Xint\infty`), and so forth.

L<sup>A</sup>T<sub>E</sub>X 2 <sub>$\varepsilon$</sub>  provides a simple wrapper for `\mathchoice` that sometimes helps produce terser symbol definitions. The macro is called `\mathpalette` and it takes two arguments. `\mathpalette` invokes the first argument, passing it one of “`\displaystyle`”, “`\textstyle`”, “`\scriptstyle`”, or “`\scriptscriptstyle`”, followed by the second argument. `\mathpalette` is useful when a symbol macro must know which math style is currently in use (e.g., to set it explicitly within an `\mbox`). Donald Arseneau posted the following `\mathpalette`-based definition of a probabilistic-independence symbol (“ $\perp\!\!\!\perp$ ”) to `comp.text.tex` in June 2000:

```
\newcommand\independent{\protect\mathpalette{\protect\independenT}{\perp\!\!\!\perp}}
\def\independenT#1#2{\mathrel{\rlap{\#1\#2}\mkern2mu{#1#2}}}
```

The `\independent` macro uses `\mathpalette` to pass the `\independenT` helper macro both the current math style and the `\perp\!\!\!\perp` symbol. `\independenT` typesets `\perp\!\!\!\perp` in the current math style, moves two math units to the right, and finally typesets a second—overlapping—copy of `\perp\!\!\!\perp`, again in the current math style. `\rlap`, which enables text overlap, is described on page 372.

Some people like their square-root signs with a trailing “hook” (i.e., “ $\sqrt[3]{x}$ ”) as this helps visually distinguish expressions like “ $\sqrt{3x}$ ” from those like “ $\sqrt[3]{3x}$ ”. In March 2002, Dan Luecking posted a `\mathpalette`-based definition of a hooked square-root symbol to `comp.text.tex`. This code was subsequently refined by Max Dohse and Scott Pakin into the version shown below, which accepts a root as an optional argument, for consistency with `\sqrt`.

---

```
\newcommand{\hksqrt}[2][]{\mathpalette\DHlhksqrt{#1}{#2,}}
\def\DHlhksqrt#1#2{\setbox0=\hbox{\#1\sqrt{#2}}\dimen0=\ht0
  \advance\dimen0-0.2\ht0
  \setbox2=\hbox{\vrule height\ht0 depth -\dimen0}%
  {\box0\lower0.4pt\box2}}
```

Notice how `\hksqrt` uses `\mathpalette` to pass the current math style (`\displaystyle`, `\textstyle`, etc.) to `\DHlhksqrt` as argument #1. `\DHlhksqrt` subsequently uses that style within an `\hbox`. The rest of the code is simply using TeX primitives to position a hook of height 0.2 times the `\sqrt` height at the right of the `\sqrt`. See The TeXbook [Knu86a] for more understanding of TeX “boxes” and “dimens”.

Sometimes, however, `amstext`'s `\text` macro is all that is necessary to make composite symbols appear correctly in subscripts and superscripts, as in the following definitions of `\nesarrow` (“↗”) and `\nwsearrow` (“↖”):<sup>6</sup>

```
\newcommand{\nesarrow}{\mathrel{\text{\nearrow$\llap{$\swarrow$}}}}
\newcommand{\nwsearrow}{\mathrel{\text{\nwarrow$\llap{$\searrow$}}}}
```

`\text` resembles L<sup>A</sup>T<sub>E</sub>X's `\mbox` command but shrinks its argument appropriately when used within a subscript or superscript. `\llap` (“left overlap”) and its counterpart, `\rlap` (“right overlap”), appear frequently when creating composite characters. `\llap` outputs its argument to the left of the current position, overlapping whatever text is already there. Similarly, `\rlap` overlaps whatever text would normally appear to the right of its argument. For example, “A`\llap{B}`” and “`\rlap{A}B`” each produce “B”. However, the result of the former is the width of “A”, and the result of the latter is the width of “B”—`\llap{...}` and `\rlap{...}` take up zero space.

In a June 2002 post to `comp.text.tex`, Donald Arseneau presented a general macro for aligning an arbitrary number of symbols on their horizontal centers and vertical baselines:

```
\makeatletter
\def\moverlay{\mathpalette\mov@rlay}
\def\mov@rlay#1#2{\leavevmode\vtop{%
  \baselineskip\z@skip \lineskiplimit-\maxdimen
  \ialign{\hfil#1##\hfil\cr#2\crcr}}}
\makeatother
```

The `\makeatletter` and `\makeatother` commands are needed to coerce L<sup>A</sup>T<sub>E</sub>X into accepting “@” as part of a macro name. `\moverlay` takes a list of symbols separated by `\cr` (TeX's equivalent of L<sup>A</sup>T<sub>E</sub>X's `\backslash`). For example, the `\topbot` command defined above could have been expressed as “`\moverlay{\top\cr\bot}`” and the `\nesarrow` command defined above could have been expressed as “`\moverlay{\nearrow\cr\swarrow}`”.

The basic concept behind `\moverlay`'s implementation is that `\moverlay` typesets the given symbols in a table that utilizes a zero `\baselineskip`. This causes every row to be typeset at the same vertical position. See The TeXbook [Knu86a] for explanations of the TeX primitives used by `\moverlay`.

Steven B. Segletes answered a question on TeX Stack Exchange, “AMS inequalities: a variant of `\gtrsim` and `\lessim`” on typesetting `\gtrsim` (“≥”) and `\lessim` (“≤”) with the `\sim` symbol slanted to match the angle of the greater-than/less-than sign. His solution incorporates the `graphicx` package's `\rotatebox` for rotating the “~”, the `stackengine` package's `\stackengine` command for stacking two symbols on top of each other, and the `scalerel` package's `\ThisStyle`, `\SavedStyle`, and `\LMex` commands for scaling the symbol based on the surrounding context. The following code due to Segletes defines the `\gtrsimslant` (“≥”) and `\lessimslant` (“≤”) symbols:<sup>7</sup>

---

<sup>6</sup>Note that if your goal is to typeset commutative diagrams or pushout/pullback diagrams, then you should probably be using `Xy-pic`.

<sup>7</sup>The code as posted on TeX Stack Exchange named these `\vargtrsim` and `\varlessim`. They are renamed here for naming consistency with symbols such as `\geqslant` (“≥”).

---

```
\newcommand\lesssimslant{\mathrel{\ensurestackMath{\ThisStyle{%
  \stackengine{- .4\LMex}{\SavedStyle<}}{%
  \rotatebox{-25}{$\SavedStyle\sim$}}{U}{r}{F}{T}{S}}}}}
\newcommand\gtrsimslant{\mathrel{\ensurestackMath{\ThisStyle{%
  \stackengine{- .4\LMex}{\SavedStyle>}}{%
  \rotatebox{25}{$\SavedStyle\sim$}}{U}{l}{F}{T}{S}}}}}
```

### 12.3.4 Modifying L<sup>A</sup>T<sub>E</sub>X-generated symbols

Oftentimes, symbols composed in the L<sup>A</sup>T<sub>E</sub>X 2 <sub>$\varepsilon$</sub>  source code can be modified with minimal effort to produce useful variations. For example, `fontdef.dtx` composes the `\ddots` symbol (see Table 306 on page 151) out of three periods, raised 7 pt., 4 pt., and 1 pt., respectively:

```
\def\ddots{\mathinner{\mkern1mu\raise7\p@%
  \vbox{\kern7\p@\hbox{.}}}\mkern2mu%
  \raise4\p@\hbox{.}\mkern2mu\raise\p@\hbox{.}\mkern1mu}}
```

`\p@` is a L<sup>A</sup>T<sub>E</sub>X 2 <sub>$\varepsilon$</sub>  shortcut for “pt” or “1.0pt”. The remaining commands are defined in The T<sub>E</sub>Xbook [Knu86a]. To draw a version of `\ddots` with the dots going along the opposite diagonal, we merely have to reorder the `\raise7\p@`, `\raise4\p@`, and `\raise\p@`:

```
\makeatletter
\def\revddots{\mathinner{\mkern1mu\raise\p@%
  \vbox{\kern7\p@\hbox{.}}}\mkern2mu%
  \raise4\p@\hbox{.}\mkern2mu\raise7\p@\hbox{.}\mkern1mu}}
\makeatother
```

`\revddots` is essentially identical to the `mathdots` package’s `\iddots` command or the `yhmath` package’s `\adots` command.

### 12.3.5 Encircling symbols

A simple, special case of combining existing symbols is to overlay a circle atop a given symbol. L<sup>A</sup>T<sub>E</sub>X’s built-in `\textcircled` (Table 19 on page 26) does exactly that: `\textcircled{A}` produces “Ⓐ”. The `circledsteps` package enhances this capability by using TikZ to draw circles—rather, ovals—that extend to fit their content, that can be colored, and that can align either the original symbol or the circled symbol on the baseline. As a simple example, `f\textcircled{ghi}j` produces “fⒶhij”, in contrast with `f\textcircled{ghi}j`, which produces “fⒶhij”.

### 12.3.6 Producing complex accents

Accents are another special case of combining existing symbols to make new symbols. While various tables in this document show how to add an accent to an existing symbol, some applications, such as transliterations from non-Latin alphabets, require *multiple* accents per character. For instance, the creator of pdfT<sub>E</sub>X writes his name as “Hàn Thé Thành”. The `dblaccnt` package enables L<sup>A</sup>T<sub>E</sub>X to stack accents, as in “H\`an Th\^e Th\~anh” (albeit not in the OT1 font encoding). In addition, the `wsuipa` package defines `\diatop` and `\diaunder` macros for putting one or more diacritics or accents above or below a given character. For example, `\diaunder[\{\diatop[\,\,\,=\}]\}\textsubdot{r}]` produces “ᬁ”. See the `wsuipa` documentation for more information.

The `accents` package facilitates the fabrication of accents in math mode. Its `\accentset` command enables *any* character to be used as an accent. For instance, `\accentset{\star}{f}` produces “ᬁ” and `\accentset{e}{X}` produces “᜔”. `\underaccent` does the same thing, but places the accent beneath the

character. This enables constructs like `\underaccent{\tilde}{V}`, which produces “ $\tilde{V}$ ”. `accents` provides other accent-related features as well; see the documentation for more information.

### 12.3.7 Creating extensible symbols

A relatively simple example of creating extensible symbols stems from a `comp.text.tex` post by Donald Arseneau (June 2003). The following code defines an equals sign that extends as far to the right as possible, just like L<sup>A</sup>T<sub>E</sub>X’s `\hrulefill` command:

```
\makeatletter
\def\equalsfill{$\m@th\mathord=\mkern-7mu
  \cleaders\hbox{$!\mathord=\!$}\hfill
  \mkern-7mu\mathord=$}
\makeatother
```

T<sub>E</sub>X’s `\cleaders` and `\hfill` primitives are the key to understanding `\equalsfill`’s extensibility. Essentially, `\equalsfill` repeats a box containing “=” plus some negative space until it fills the maximum available horizontal space. `\equalsfill` is intended to be used with L<sup>A</sup>T<sub>E</sub>X’s `\stackrel` command, which stacks one mathematical expression (slightly reduced in size) atop another. Hence, “`\stackrel{a}{\rightarrow}`” produces “ $\overset{a}{\rightarrow}$ ” and “`X \stackrel{\text{definition}}{\rightarrow} Y`” produces “ $X \overset{\text{definition}}{\rightarrow} Y$ ”.

If all that needs to extend are horizontal and vertical lines—as opposed to repeated symbols such as the “=” in the previous example—L<sup>A</sup>T<sub>E</sub>X’s `array` or `tabular` environments may suffice. Consider the following code (due to a February 1999 `comp.text.tex` post by Donald Arseneau and subsequent modifications by Billy Yu and Scott Pakin) for typesetting annuity and life-insurance symbols:

```
\DeclareRobustCommand{\actuarial}[2][]{%
  \def\arraystretch{0}%
  \setlength\arraycolsep{0.5pt}%
  \setlength\arrayrulewidth{0.5pt}%
  \setbox0=\hbox{$\scriptstyle#1#2$}%
  \begin{array}[b]{*2{c}>{\scriptstyle c}|}
    \cline{2-2}%
    \rule[1.25pt]{0pt}{\ht0}%
    #1 & #2%
  \end{array}%
}
```

Using the preceding definition, one can type, e.g., “`$a_{\actuarial{n}}`” to produce “ $a_{\overline{n}}$ ” and “`$a_{\actuarial[x]{n}}`” to produce “ $a_{x:\overline{n}}$ ”. This is similar in concept to how the `actuarialangle` package defines its `\actuarialangle` command (Table 287). For a more complete solution for typesetting actuarial symbols see the `actuariesymbol` package.

A more complex example of composing accents is the following definition of extensible `\overbracket`, `\underbracket`, `\overparenthesis`, and `\underparenthesis` symbols, taken from a May 2002 `comp.text.tex` post by Donald Arseneau:

```
\makeatletter
\def\overbracket#1{\mathop{\vbox{\ialign{##\crcr\noalign{\kern3\p@}
  \downbracketfill\crcr\noalign{\kern3\p@\nointerlineskip}
  $ \hfil\displaystyle{#1} \hfil \$ \crcr}}}\limits}
\def\underbracket#1{\mathop{\vtop{\ialign{##\crcr
  \$ \hfil\displaystyle{#1} \hfil \$ \crcr\noalign{\kern3\p@\nointerlineskip}
  \upbracketfill\crcr\noalign{\kern3\p@}}}}}\limits}
```

```
\def\overparenthesis#1{\mathop{\vbox{\ialign{##\crcr\noalign{\kern3\p@}\downparenthfill\crcr\noalign{\kern3\p@\nointerlineskip}\$\\hfil\displaystyle{#1}\hfil\$\\crcr}}}\limits}
\def\underparenthesis#1{\mathop{\vtop{\ialign{##\crcr\$\\hfil\displaystyle{#1}\hfil\$\\crcr\noalign{\kern3\p@\nointerlineskip}\$\\upparenthfill\crcr\noalign{\kern3\p@}}}}}\limits}
\def\downparenthfill{$\m@th\braceleft\leaders\vrule\hfill\braceright$}
\def\upparenthfill{$\m@th\bracel\leaders\vrule\hfill\braceru$}
\def\upbracketfill{$\m@th\makesm@sh{\llap{\vrule\@height3\p@\@width.7\p@}}\%\\leaders\vrule\@height.7\p@\hfill\\makesm@sh{\rlap{\vrule\@height3\p@\@width.7\p@}}\$}
\def\downbracketfill{$\m@th\makesm@sh{\llap{\vrule\@height.7\p@\@depth2.3\p@\@width.7\p@}}\%\\leaders\vrule\@height.7\p@\hfill\\makesm@sh{\rlap{\vrule\@height.7\p@\@depth2.3\p@\@width.7\p@}}\$}
\makeatother
```

Table 690 showcases these accents. The *TeXbook* [Knu86a] or another book on *TeX* primitives is indispensable for understanding how the preceding code works. The basic idea is that `\downparenthfill`, `\upparenthfill`, `\downbracketfill`, and `\upbracketfill` do all of the work; they output a left symbol (e.g., `\braceleft` [“ $\smash{\langle}$ ”] for `\downparenthfill`), a horizontal rule that stretches as wide as possible, and a right symbol (e.g., `\braceright` [“ $\smash{\rangle}$ ”] for `\downparenthfill`). `\overbracket`, `\underbracket`, `\overparenthesis`, and `\underparenthesis` merely create a table whose width is determined by the given text, thereby constraining the width of the horizontal rules.

TABLE 690: Manually Composed Extensible Accents

$\overbrace{abc}$	<code>\overbracket{abc}</code>	$\underbrace{abc}$	<code>\underbracket{abc}</code>
$\overbrace{abc}$	<code>\overbracket{abc}</code>	$\underbrace{abc}$	<code>\underbracket{abc}</code>

Note that the `simplewick` package provides mechanisms for typesetting Wick contractions, which utilize `\overbracket-` and `\underbracket-`like brackets of variable width *and* height (or depth). For example, “`\acontraction{}{A}{B}{C}\acontraction[2ex]{A}{B}{C}{D}\bcontraction{}{A}{BC}{D}ABCD`” produces



See the `simplewick` documentation for more information.

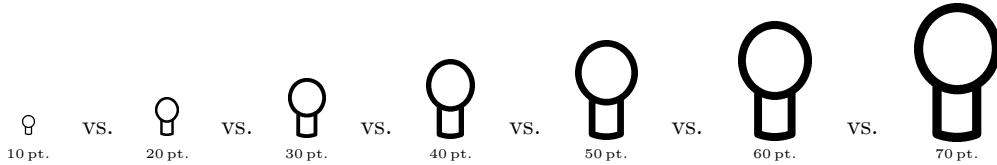
### 12.3.8 Developing new symbols from scratch

Sometimes it is simply not possible to define a new symbol in terms of existing symbols. Fortunately, most, if not all, *TeX* distributions are shipped with a tool called METAFONT which is designed specifically for creating fonts to be used with *TeX*. The *METAFONTbook* [Knu86b] is the authoritative text on METAFONT. If you plan to design your own symbols with METAFONT, The *METAFONTbook* is essential reading. You may also want to read the freely available METAFONT primer located at <http://metafont.tutorial.free.fr/>. The following is an extremely brief tutorial on how to create a new L<sup>A</sup>T<sub>E</sub>X symbol using METAFONT. Its primary purpose is to cover the L<sup>A</sup>T<sub>E</sub>X-specific operations not mentioned in The *METAFONTbook* and to demonstrate that symbol-font creation is not necessarily a difficult task.

Suppose we need a symbol to represent a light bulb (“ $\varPsi$ ”).<sup>8</sup> The first step is to draw this in METAFONT.

<sup>8</sup>I'm not a very good artist; you'll have to pretend that “ $\varPsi$ ” looks like a light bulb.

It is common to separate the font into two files: a size-dependent file, which specifies the design size and various font-specific parameters that are a function of the design size; and a size-independent file, which draws characters in the given size. Figure 12.2 shows the METAFONT code for `lightbulb10.mf`. `lightbulb10.mf` specifies various parameters that produce a 10 pt. light bulb then loads `lightbulb.mf`. Ideally, one should produce `lightbulb<size>.mf` files for a variety of `<size>`s. This is called “optical scaling”. It enables, for example, the lines that make up the light bulb to retain the same thickness at different font sizes, which looks much nicer than the alternative—and default—“mechanical scaling”. When a `lightbulb<size>.mf` file does not exist for a given size `<size>`, the computer mechanically produces a wider, taller, thicker symbol:



```

font_identifier := "LightBulb10";                                % Name the font.
font_size 10pt#;                                                 % Specify the design size.
em# := 10pt#;                                                   % "M" width is 10 points.
cap# := 7pt#;                                                   % Capital letter height is 7 points above the baseline.
sb# := 1/4pt#;                                                 % Leave this much space on the side of each character.
o# := 1/16pt#;                                                 % Amount that curves overshoot borders.
input lightbulb                                              % Load the file that draws the actual glyph.

```

Figure 12.2: Sample METAFONT size-specific file (`lightbulb10.mf`)

`lightbulb.mf`, shown in Figure 12.3, draws a light bulb using the parameters defined in `lightbulb10.mf`. Note that the the filenames “`lightbulb10.mf`” and “`lightbulb.mf`” do not follow the Berry font-naming scheme [Ber01]; the Berry font-naming scheme is largely irrelevant for symbol fonts, which generally lack bold, italic, small-caps, slanted, and other such variants.

The code in Figures Figure 12.2 and Figure 12.3 is heavily commented and should demonstrate some of the basic concepts behind METAFONT usage: declaring variables, defining points, drawing lines and curves, and preparing to debug or fine-tune the output. Again, The METAFONTbook [Knu86b] is the definitive reference on METAFONT programming.

METAFONT can produce “proofs” of fonts—large, labeled versions that showcase the logical structure of each character. In fact, proof mode is METAFONT’s default mode. To produce a proof of `lightbulb10.mf`, issue the following commands at the operating-system prompt:

<code>prompt&gt; mf lightbulb10.mf</code>	$\Leftarrow$ Produces <code>lightbulb10.2602gf</code>
<code>prompt&gt; gftodvi lightbulb10.2602gf</code>	$\Leftarrow$ Produces <code>lightbulb10.dvi</code>

You can then view `lightbulb10.dvi` with any DVI viewer. The result is shown in Figure 12.4. Observe how the grid defined with `makegrid` at the bottom of Figure 12.3 draws vertical lines at positions 0,  $sb$ ,  $w/2$ , and  $w - sb$  and horizontal lines at positions 0,  $-1pt$ ,  $y_2$ , and  $h$ . Similarly, observe how the `penlabels` command labels all of the important coordinates:  $z_1, z_2, \dots, z_8$  and  $z_{67}$ , which `lightbulb.mf` defines to lie between  $z_6$  and  $z_7$ .

Most, if not all, TeX distributions include a Plain TeX file called `testfont.tex` that is useful for testing new fonts in a variety of ways. One useful routine produces a table of all of the characters in the font:

`prompt> tex testfont`

```

mode _setup;                                     % Target a given printer.

define _pixels(em, cap, sb);                   % Convert to device-specific units.
define _corrected _pixels(o);                  % Same, but add a device-specific fudge factor.

%% Define a light bulb at the character position for "A"
%% with width  $1/2em$ , height  $cap$ , and depth  $1pt$ .
beginchar("A",  $1/2em$ ,  $cap$ ,  $1pt$ ); "A light bulb";
  pickup pencircle scaled  $1/2pt$ ;             % Use a pen with a small, circular tip.

  %% Define the points we need.
  top z1 = ( $w/2, h + o$ );                   %  $z_1$  is at the top of a circle.
  rt z2 = ( $w + sb + o - x_4, y_4$ );          %  $z_2$  is at the same height as  $z_4$  but the opposite side.
  bot z3 = ( $(z_1 - (0, w - sb - o))$ );       %  $z_3$  is at the bottom of the circle.
  lft z4 = ( $(sb - o, 1/2[y_1, y_3])$ );        %  $z_4$  is on the left of the circle.
  path bulb;                                  % Define a path for the bulb itself.
  bulb =  $z_1 \dots z_2 \dots z_3 \dots z_4 \dots$  cycle; % The bulb is a closed path.

   $z_5 = \text{point } 2 - 1/3 \text{ of } bulb$ ;      %  $z_5$  lies on the bulb, a little to the right of  $z_3$ .
   $z_6 = (x_5, 0)$ ;                            %  $z_6$  is at the bottom, directly under  $z_5$ .
   $z_7 = (x_8, 0)$ ;                            %  $z_7$  is at the bottom, directly under  $z_8$ .
   $z_8 = \text{point } 2 + 1/3 \text{ of } bulb$ ;      %  $z_8$  lies on the bulb, a little to the left of  $z_3$ .
  bot z67 = ( $1/2[x_6, x_7], pen\_bot - o - 1/8pt$ ); %  $z_{67}$  lies halfway between  $z_6$  and  $z_7$  but a jot
lower.

  %% Draw the bulb and the base.
  draw bulb;                                    % Draw the bulb proper.
  draw  $z_5 \dots z_6 \dots z_{67} \dots z_7 \dots z_8$ ; % Draw the base of the bulb.

  %% Display key positions and points to help us debug.
  makegrid(0,  $sb, w/2, w - sb$ )(0,  $-1pt, y_2, h$ ); % Label "interesting" x and y coordinates.
  penlabels(1, 2, 3, 4, 5, 6, 67, 7, 8);           % Label control points for debugging.

endchar;
end

```

Figure 12.3: Sample METAFONT size-independent file (lightbulb.mf)

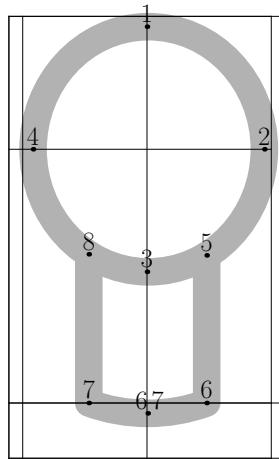


Figure 12.4: Proof diagram of lightbulb10.mf

```
This is TeX, Version 3.14159 (Web2C 7.3.1)
(/usr/share/texmf/tex/plain/base/testfont.tex
Name of the font to test = lightbulb10
Now type a test command (\help for help):)
*\table

*\bye
[1]
Output written on testfont.dvi (1 page, 1516 bytes).
Transcript written on testfont.log.
```

The resulting table, stored in `testfont.dvi` and illustrated in Figure 12.5, shows every character in the font. To understand how to read the table, note that the character code for “A”—the only character defined by `lightbulb10.mf`—is 41 in hexadecimal (base 16) and 101 in octal (base 8).

Test of lightbulb10 on March 11, 2003 at 1127																	
	'0	'1	'2	'3	'4	'5	'6	'7	'8	'9	'A	'B	'C	'D	'E	'F	'4x
'10x		Q															
'11x																	

Figure 12.5: Font table produced by `testfont.tex`

The LightBulb10 font is now usable by `TeX`. `LATEX 2 $\varepsilon$` , however, needs more information before documents can use the font. First, we create a font-description file that tells `LATEX 2 $\varepsilon$`  how to map fonts in a given font family and encoding to a particular font in a particular font size. For symbol fonts, this mapping is fairly simple. Symbol fonts almost always use the “U” (“Unknown”) font encoding and frequently occur in only one variant: normal weight and non-italicized. The filename for a font-description file is important; it must be of the form “`<encoding><family>.fd`”, where `<encoding>` is the lowercase version of the encoding name (typically “u” for symbol fonts) and `<family>` is the name of the font family. For LightBulb10, let’s call this “bulb”. Figure 12.6 lists the contents of `ubulb.fd`. The document “`LATEX 2 $\varepsilon$  Font Selection`” [LAT19] describes `\DeclareFontFamily` and `\DeclareFontShape` in detail, but the gist of `ubulb.fd` is first to declare a U-encoded version of the `bulb` font family and then to specify that a `LATEX 2 $\varepsilon$`  request for a U-encoded version of `bulb` with a (m)edium font series (as opposed to, e.g., bold) and a (n)ormal font shape (as opposed to, e.g., italic) should translate into a `TeX` request for `lightbulb10.tfm` mechanically scaled to the current font size.

```
\DeclareFontFamily{U}{bulb}{}  
\DeclareFontShape{U}{bulb}{m}{n}{<-> lightbulb10}{}  
}
```

Figure 12.6: `LATEX 2 $\varepsilon$`  font-description file (`ubulb.fd`)

The final step is to write a `LATEX 2 $\varepsilon$`  style file that defines a name for each symbol in the font. Because we have only one symbol our style file, `lightbulb.sty` (Figure 12.7), is rather trivial. Note that instead of typesetting “A” we could have had `\lightbulb` typeset “`\char65`”, “`\char"41`”, or “`\char'101`” (respectively, decimal, hexadecimal, and octal character offsets into the font). For a simple, one-character symbol font such as LightBulb10 it would be reasonable to merge `ubulb.fd` into `lightbulb.sty` instead of maintaining

two separate files. In either case, a document need only include “`\usepackage{lightbulb}`” to make the `\lightbulb` symbol available.

```
\newcommand{\lightbulb}{\usefont{U}{bulb}{m}{n}A}
```

Figure 12.7: L<sup>A</sup>T<sub>E</sub>X 2 <sub>$\varepsilon$</sub>  style file (`lightbulb.sty`)

METAFONT normally produces bitmapped fonts. However, it is also possible, with the help of some external tools, to produce PostScript Type 1 fonts. These have the advantages of rendering better in Adobe® Acrobat® (at least in versions prior to 6.0) and of being more memory-efficient when handled by a PostScript interpreter. See <http://www.texfaq.org/FAQ-textrace.html> for pointers to tools that can produce Type 1 fonts from METAFONT.

## 12.4 Math-mode spacing

Terms such as “binary operators”, “relations”, and “punctuation” in Chapter 3 primarily regard the surrounding spacing. (See the Short Math Guide for L<sup>A</sup>T<sub>E</sub>X [Dow00] for a nice exposition on the subject.) To use a symbol for a different purpose, you can use the T<sub>E</sub>X commands `\mathord`, `\mathop`, `\mathbin`, `\mathrel`, `\mathopen`, `\mathclose`, and `\mathpunct`. For example, if you want to use `\downarrow` as a variable (an “ordinary” symbol) instead of a delimiter, you can write “`$3 x + \mathord{\downarrow}`” to get the properly spaced “ $3x + \downarrow$ ” rather than the awkward-looking “ $3x + \downarrow$ ”. Similarly, to create a dotted-union symbol (“ $\dot{\cup}$ ”) that spaces like the ordinary set-union symbol (`\cup`) it must be defined with `\mathbin`, just as `\cup` is. Contrast “`$A \dot{\cup} B$`” (“ $A \dot{\cup} B$ ”) with “`$A \mathbin{\dot{\cup}} B$`” (“ $A \dot{\cup} B$ ”). See The T<sub>E</sub>Xbook [Knu86a] for the definitive description of math-mode spacing.

The purpose of the “log-like symbols” in Table 203 and Table 204 is to provide the correct amount of spacing around and within multiletter function names. Table 691 on page 379 contrasts the output of the log-like symbols with various, naïve alternatives. In addition to spacing, the log-like symbols also handle subscripts properly. For example, “`\max_{p \in P}`” produces “ $\max_{p \in P}$ ” in text, but “ $\max$ ” as part of a displayed formula.

TABLE 691: Spacing Around/Within Log-like Symbols

L <sup>A</sup> T <sub>E</sub> X expression	Output
<code>\$r \sin \theta\$</code>	$r \sin \theta$ (best)
<code>\$r sin \theta\$</code>	$rsin\theta$
<code>\$r \mbox{\sin} \theta\$</code>	$rsin\theta$
<code>\$r \mathrm{\sin} \theta\$</code>	$rsin\theta$

The `amsmath` package makes it straightforward to define new log-like symbols:

```
\DeclareMathOperator{\atan}{atan}
\DeclareMathOperator*{\lcm}{lcm}
```

The difference between `\DeclareMathOperator` and `\DeclareMathOperator*` involves the handling of subscripts. With `\DeclareMathOperator*`, subscripts are written beneath log-like symbols in display style and to the right in text style. This is useful for limit operators (e.g., `\lim`) and functions that tend to map over a set (e.g., `\min`). In contrast, `\DeclareMathOperator` tells T<sub>E</sub>X that subscripts should always be displayed to the right of the operator, as is common for functions that take a single parameter (e.g., `\log` and `\cos`).

Table 692 contrasts symbols declared with `\DeclareMathOperator` and `\DeclareMathOperator*` in both text style (`$. . $.` ) and display style (`\[. . \]`).<sup>9</sup>

TABLE 692: Defining new log-like symbols

Declaration function	<code>\$\newlogsym_{p \in P}\$</code>	<code>\[ \newlogsym_{p \in P} \]</code>
<code>\DeclareMathOperator</code>	$\text{newlogsym}_{p \in P}$	$\text{newlogsym}_{p \in P}$
<code>\DeclareMathOperator*</code>	$\text{newlogsym}_{p \in P}$	$\text{newlogsym}_{p \in P}$

It is common to use a thin space (`\,`) between the words of a multiword operators, as in `\argmax{\arg\max}`. `\liminf`, `\limsup`, and all of the log-like symbols shown in Table 204 utilize this spacing convention.

## 12.5 Bold mathematical symbols

LATEX does not normally use bold symbols when typesetting mathematics. However, bold symbols are occasionally needed, for example when naming vectors. Any of the approaches described at <http://www.texfaq.org/FAQ-boldgreek.html> can be used to produce bold mathematical symbols. Table 693 contrasts the output produced by these various techniques. As the table illustrates, these techniques exhibit variation in their formatting of Latin letters (upright vs. italic), formatting of Greek letters (bold vs. normal), formatting of operators and relations (bold vs. normal), and spacing. `xfakebold`'s `\setBold` command is unique in that it takes a thickness argument and supports arbitrary symbol thickness, although it works only with vector fonts, not bitmapped fonts.

TABLE 693: Producing bold mathematical symbols

Package	Code	Output	
<code>none</code>	<code>\$\alpha + b = \Gamma \div D\$</code>	$\alpha + b = \Gamma \div D$	(no bold)
<code>none</code>	<code>\$\mathbf{\alpha} + b = \Gamma \div D\$</code>	$\alpha + \mathbf{b} = \Gamma \div D$	
<code>none</code>	<code>\boldsymbol{\alpha} + b = \Gamma \div D\$</code>	$\alpha + \mathbf{b} = \Gamma \div D$	
<code>amsbsy</code>	<code>\$\pmb{\alpha} + b = \Gamma \div D\$</code>	$\alpha + \mathbf{b} = \Gamma \div D$	(faked bold)
<code>amsbsy</code>	<code>\$\boldsymbol{\alpha} + b = \Gamma \div D\$</code>	$\alpha + \mathbf{b} = \Gamma \div D$	
<code>bm</code>	<code>\$\bm{\alpha} + b = \Gamma \div D\$</code>	$\alpha + \mathbf{b} = \Gamma \div D$	
<code>fixmath</code>	<code>\$\mathbf{\alpha} + b = \Gamma \div D\$</code>	$\alpha + \mathbf{b} = \Gamma \div D$	
<code>xfakebold</code>	<code>\setBold[0.3] \$\alpha + b = \Gamma \div D\$ \unsetBold</code>	$\alpha + \mathbf{b} = \Gamma \div D$	(faked bold)

## 12.6 ASCII and Latin 1 quick reference

Table 694 on page 381 amalgamates data from various other tables in this document into a convenient reference for LATEX 2<sub>ε</sub> typesetting of ASCII characters, i.e., the characters available on a typical U.S. computer

<sup>9</sup>Note that `\displaystyle` can be used to force display style within `$. . $.`  and `\textstyle` can be used to force text style within `\[. . \]`.

keyboard. The first two columns list the character's ASCII code in decimal and hexadecimal. The third column shows what the character looks like. The fourth column lists the  $\text{\LaTeX} 2_{\varepsilon}$  command to typeset the character as a text character. And the fourth column lists the  $\text{\LaTeX} 2_{\varepsilon}$  command to typeset the character within a  $\text{\ttt}\{...\}$  command (or, more generally, when  $\text{\ttfamily}$  is in effect).

TABLE 694:  $\text{\LaTeX} 2_{\varepsilon}$  ASCII Table

Dec	Hex	Char	Body text	$\text{\ttt}$	Dec	Hex	Char	Body text	$\text{\ttt}$
33	21	!	!	!	62	3E	>	$\text{\textgreater}$	>
34	22	"	$\text{\textquotedbl}$	"	63	3F	?	$\text{\textquestion}$	?
35	23	#	$\text{\#}$	$\text{\#}$	64	40	@	$\text{\textcircledcirc}$	$\text{\textcircledcirc}$
36	24	\$	$\text{\$}$	$\text{\$}$	65	41	A	A	A
37	25	%	$\text{\%}$	$\text{\%}$	66	42	B	B	B
38	26	&	$\text{\&}$	$\text{\&}$	67	43	C	C	C
39	27	,	,	,	68	44	:	:	:
40	28	(	(	(	69	5A	Z	Z	Z
41	29	)	)	)	70	5B	[	[	[
42	2A	*	*	*	71	5C	\	$\text{\textbackslash}$	$\text{\textbackslash}$
43	2B	+	+	+	72	5D	]	]	]
44	2C	,	,	,	73	5E	^	$\text{\textasciicircum}$	$\text{\textasciicircum}$
45	2D	-	-	-	74	5F	_	$\text{\textasciitilde}$	$\text{\textasciitilde}$
46	2E	.	.	.	75	60	‘	‘	‘
47	2F	/	/	/	76	61	a	a	a
48	30	0	0	0	77	62	b	b	b
49	31	1	1	1	78	63	c	c	c
50	32	2	2	2	79	64	d	d	d
...	...	...	...	...	80	65	e	e	e
57	39	9	9	9	81	66	f	f	f
58	3A	:	:	:	82	67	g	g	g
59	3B	;	;	;	83	68	h	h	h
60	3C	<	$\text{\textless}$	$\text{\textless}$	84	69	i	i	i
61	3D	=	$\text{\textless}$	=	85	70	j	j	j

The following are some additional notes about the contents of Table 694:

- “” is not available in the OT1 font encoding.
- Table 694 shows a close quote for character 39 for consistency with the open quote shown for character 96. A straight quote can be typeset using  $\text{\textquotesingle}$  (cf. Table 47).
- The characters “<”, “>”, and “|” do work as expected in math mode, although they produce, respectively, “\_”, “\_”, and “—” in text mode when using the OT1 font encoding.<sup>10</sup> The following are some alternatives for typesetting “<”, “>”, and “|”:
  - Specify a document font encoding other than OT1 (as described on page 16).
  - Use the appropriate symbol commands from Table 2 on page 19, viz.  $\text{\textless}$ ,  $\text{\textgreater}$ , and  $\text{\textbar}$ .

<sup>10</sup>Donald Knuth didn't think such symbols were important outside of mathematics so he omitted them from his text fonts.

- Enter the symbols in math mode instead of text mode, i.e.,  $\$<\$, \$>\$,$  and  $\$|\$.$

Note that for typesetting metavariables many people prefer `\textlangle` and `\textrangle` to `\textless` and `\textgreater`; i.e., “`\langle filename \rangle`” instead of “`<filename>`”.

- Although “/” does not require any special treatment, L<sup>A</sup>T<sub>E</sub>X additionally defines a `\slash` command which outputs the same glyph but permits a line break afterwards. That is, “increase/decrease” is always typeset as a single entity while “increase`\slash`{}decrease” may be typeset with “increase/” on one line and “decrease” on the next.
- `\textasciicircum` can be used instead of `\^{}{}`, and `\textasciitilde` can be used instead of `\~{}{}`. Note that `\textasciitilde` and `\~{}{}` produce raised, diacritic tildes. “Text” (i.e., vertically centered) tildes can be generated with either the math-mode `\sim` command (shown in Table 98 on page 67), which produces a somewhat wide “ $\sim$ ”, or the `textcomp` package’s `\texttildelow` (shown in Table 47 on page 34), which produces a vertically centered “ $\sim$ ” in most fonts but a baseline-oriented “ $\sim$ ” in Computer Modern, `txfonts`, `pxfonts`, and various other fonts originating from the T<sub>E</sub>X world. If your goal is to typeset tildes in URLs or Unix filenames, your best bet is to use the `url` package, which has a number of nice features such as proper line-breaking of such names.
- The various `\char` commands within `\textttt` are necessary only in the OT1 font encoding. In other encodings (e.g., T1), commands such as `\{`, `\}`, `\_`, and `\textbackslash` all work properly.
- The code page 437 (IBM PC) version of ASCII characters 1 to 31 can be typeset using the `ascii` package. See Table 368 on page 170.
- To replace “‘” and “’” with the more computer-like (and more visibly distinct) “`” and “`” within a `verbatim` environment, use the `upquote` package. Outside of `verbatim`, you can use `\char18` and `\char13` to get the modified quote characters. (The former is actually a grave accent.)

Similar to Table 694, Table 695 on the following page is an amalgamation of data from other tables in this document. While Table 694 shows how to typeset the 7-bit ASCII character set, Table 695 shows the Latin 1 (Western European) character set, also known as ISO-8859-1.

The following are some additional notes about the contents of Table 695:

- A “(tc)” after a symbol name means that the `textcomp` package must be loaded to access that symbol. A “(T1)” means that the symbol requires the T1 font encoding. The `fontenc` package can change the font encoding document-wide.
- Many of the `\text...` accents can also be produced using the accent commands shown in Table 19 on page 26 plus an empty argument. For instance, `\={}` is essentially the same as `\textasciimacron`.
- The commands in the “L<sup>A</sup>T<sub>E</sub>X 2 <sub>$\varepsilon$</sub> ” columns work both in body text and within a `\textttt{...}` command (or, more generally, when `\ttfamily` is in effect).
- The “£” and “\$” glyphs occupy the same slot (36) of the OT1 font encoding, with “£” appearing in italic fonts and “\$” appearing in roman fonts. A problem with L<sup>A</sup>T<sub>E</sub>X’s default handling of this double-mapping is that “`\sffamily\slshape\pounds`” produces “\$”, not “£”. Other font encodings use separate slots for the two characters and are therefore robust to the problem of “£”/“\$” conflicts. Authors who use `\pounds` should select a font encoding other than OT1 (as explained on page 16) or use the `textcomp` package, which redefines `\pounds` to use the TS1 font encoding.
- Character 173, `\-`, is shown as “-” but is actually a discretionary hyphen; it appears only at the end of a line.

TABLE 695: LATEX 2<sub>E</sub> Latin 1 Table

Dec	Hex	Char	LATEX 2 <sub>E</sub>		Dec	Hex	Char	LATEX 2 <sub>E</sub>	
161	A1	¡	!‘		209	D1	Ñ	\~{N}	
162	A2	¢	\textcent	(tc)	210	D2	Ò	\‘{O}	
163	A3	£	\pounds		211	D3	Ó	\’{O}	
164	A4	¤	\textcurrency	(tc)	212	D4	Ô	\^{O}	
165	A5	¥	\textyen	(tc)	213	D5	Õ	\~{O}	
166	A6	¦	\textbrokenbar	(tc)	214	D6	Ö	\"{"O}	
167	A7	§	\S		215	D7	×	\texttimes	(tc)
168	A8	..	\textasciidieresis	(tc)	216	D8	Ø	\o	
169	A9	©	\textcopyright		217	D9	Ù	\‘{U}	
170	AA	ª	\textordfeminine		218	DA	Ú	\’{U}	
171	AB	«	\guillemetleft	(T1)	219	DB	Û	\~{U}	
172	AC	»	\textlnot	(tc)	220	DC	Ü	\"{"U}	
173	AD	-	\-		221	DD	Ý	\’{Y}	
174	AE	®	\textregistered		222	DE	Þ	\TH	(T1)
175	AF	—	\textasciimacron	(tc)	223	DF	ß	\ss	
176	B0	°	\textdegree	(tc)	224	E0	à	\‘{a}	
177	B1	±	\textpm	(tc)	225	E1	á	\’{a}	
178	B2	²	\texttwosuperior	(tc)	226	E2	â	\~{a}	
179	B3	³	\textthreesuperior	(tc)	227	E3	ã	\~{a}	
180	B4	‘	\textasciacute	(tc)	228	E4	ä	\"{"a}	
181	B5	µ	\textmu	(tc)	229	E5	å	\aa	
182	B6	¶	\P		230	E6	æ	\ae	
183	B7	·	\textperiodcentered		231	E7	ç	\c{c}	
184	B8	¸	\c{c}		232	E8	è	\‘{e}	
185	B9	¹	\textonesuperior	(tc)	233	E9	é	\’{e}	
186	BA	º	\textordmasculine		234	EA	ê	\~{e}	
187	BB	»	\guillemetright	(T1)	235	EB	ë	\"{"e}	
188	BC	¼	\textonequarter	(tc)	236	EC	ì	\‘{i}	
189	BD	½	\textonehalf	(tc)	237	ED	í	\’{i}	
190	BE	¾	\textthreequarters	(tc)	238	EE	î	\~{i}	
191	BF	¿	?’		239	EF	ï	\"{"i}	
192	C0	À	\‘{A}		240	F0	ð	\dh	(T1)
193	C1	Á	\’{A}		241	F1	ñ	\~{n}	
194	C2	Â	\^{A}		242	F2	ò	\‘{o}	
195	C3	Ã	\~{A}		243	F3	ó	\’{o}	
196	C4	Ä	\"{"A}		244	F4	ô	\~{o}	
197	C5	Å	\AA		245	F5	ö	\~{o}	
198	C6	Æ	\AE		246	F6	ö	\"{"o}	
199	C7	Ç	\c{C}		247	F7	÷	\textdiv	(tc)
200	C8	È	\‘{E}		248	F8	ø	\o	
201	C9	É	\’{E}		249	F9	ù	\‘{u}	
202	CA	Ê	\^{E}		250	FA	ú	\’{u}	
203	CB	Ë	\"{"E}		251	FB	û	\~{u}	
204	CC	Ì	\‘{I}		252	FC	ü	\"{"u}	
205	CD	Í	\’{I}		253	FD	ý	\’{y}	
206	CE	Î	\~{I}		254	FE	þ	\th	(T1)
207	CF	Ï	\"{"I}		255	FF	ÿ	\"{"y}	
208	D0	Ð	\DH						

TABLE 696: L<sup>A</sup>T<sub>E</sub>X 2 <sub>$\varepsilon$</sub>  Code Page 1252 Table

Dec	Hex	Char	L <sup>A</sup> T <sub>E</sub> X 2 <sub><math>\varepsilon</math></sub>		Dec	Hex	Char	L <sup>A</sup> T <sub>E</sub> X 2 <sub><math>\varepsilon</math></sub>
128	80	€	\texteuro	(tc)	145	91	‘	‘
130	82	,	\quotesinglbase	(T1)	146	92	,	,
131	83	ƒ	\textit{f}		147	93	“	“
132	84	„	\quotedblbase	(T1)	148	94	”	”
133	85	…	\dots		149	95	•	\textbullet
134	86	†	\dag		150	96	—	—
135	87	‡	\ddag		151	97	—	—
136	88	^	\^{}{}		152	98	~	\~{}{}
137	89	%	\textperthousand	(tc)	153	99	™	\texttrademark
138	8A	Š	\v{S}		154	9A	š	\v{s}
139	8B	<	\guilsinglleft	(T1)	155	9B	>	\guilsinglright (T1)
140	8C	Œ	\OE		156	9C	œ	\oe
142	8E	Ž	\v{Z}		158	9E	ž	\v{z}
					159	9F	Ÿ	\"{"Y}

Microsoft® Windows® normally uses a superset of Latin 1 called “Code Page 1252” or “CP1252” for short. CP1252 introduces symbols in the Latin 1 “invalid” range (characters 128–159). Table 696 presents the characters with which CP1252 augments the standard Latin 1 table.

The following are some additional notes about the contents of Table 696:

- As in Table 695, a “(tc)” after a symbol name means that the `textcomp` package must be loaded to access that symbol. A “(T1)” means that the symbol requires the T1 font encoding. The `fontenc` package can change the font encoding document-wide.
- Not all characters in the 128–159 range are defined.
- Look up “euro signs” in the index for alternatives to `\texteuro`.

While too large to incorporate into this document, a listing of ISO 8879:1986 SGML/XML character entities and their L<sup>A</sup>T<sub>E</sub>X equivalents is available from <http://www.bitjungle.com/isoent/>. Some of the characters presented there make use of `isoent`, a L<sup>A</sup>T<sub>E</sub>X 2 <sub>$\varepsilon$</sub>  package (available from the same URL) that fakes some of the missing ISO glyphs using the L<sup>A</sup>T<sub>E</sub>X `picture` environment.<sup>11</sup>

## 12.7 Unicode characters

Unicode is a “universal character set”—a standard for encoding (i.e., assigning unique numbers to) the symbols appearing in many of the world’s languages. While ASCII can represent 128 symbols and Latin 1 can represent 256 symbols, Unicode can represent an astonishing 1,114,112 symbols.

Because T<sub>E</sub>X and L<sup>A</sup>T<sub>E</sub>X predate the Unicode standard and Unicode fonts by almost a decade, support for Unicode has had to be added to the base T<sub>E</sub>X and L<sup>A</sup>T<sub>E</sub>X systems. Note first that L<sup>A</sup>T<sub>E</sub>X distinguishes between *input* encoding—the characters used in the `.tex` file—and *output* encoding—the characters that appear in the generated `.dvi`, `.pdf`, etc. file.

<sup>11</sup>`isoent` is not featured in this document, because it is not available from CTAN and because the faked symbols are not “true” characters; they exist in only one size, regardless of the body text’s font size.

### 12.7.1 Inputting Unicode characters

To include Unicode characters in a `.tex` file, load the `ucs` package and load the `inputenc` package with the `utf8x` (“UTF-8 extended”) option.<sup>12</sup> These packages enable  $\text{\LaTeX}$  to translate UTF-8 sequences to  $\text{\LaTeX}$  commands, which are subsequently processed as normal. For example, the UTF-8 text “Copyright © 2024”—“©” is not an ASCII character and therefore cannot be input directly without packages such as `ucs/inputenc`—is converted internally by `inputenc` to “Copyright \textcopyright{} 2024” and therefore typeset as “Copyright © 2024”.

The `ucs/inputenc` combination supports only a tiny subset of Unicode’s million-plus symbols. Additional symbols can be added manually using the `\DeclareUnicodeCharacter` command. `\DeclareUnicodeCharacter` takes two arguments: a Unicode number and a  $\text{\LaTeX}$  command to execute when the corresponding Unicode character is encountered in the input. For example, the Unicode character “degree celsius” (“°C”) appears at character position U+2103.<sup>13</sup> However, “°C” is not one of the characters that `ucs` and `inputenc` recognize. The following document shows how to use `\DeclareUnicodeCharacter` to tell  $\text{\LaTeX}$  that the “°C” character should be treated as a synonym for `\textcelsius`:

```
\documentclass{article}
\usepackage{ucs}
\usepackage[utf8x]{inputenc}
\usepackage{textcomp}

\DeclareUnicodeCharacter{"2103}{\textcelsius} % Enable direct input of U+2103.

\begin{document}
It was a balmy 21°C.
\end{document}
```

which produces

It was a balmy 21°C.

See the `ucs` documentation for more information and for descriptions of the various options that control `ucs`’s behavior.

### 12.7.2 Outputting Unicode characters

Orthogonal to the ability to include Unicode characters in a  $\text{\LaTeX}$  input file is the ability to include a given Unicode character in the corresponding output file. By far the easiest approach is to use `Lua $\text{\LaTeX}$`  or `X $\text{\LaTeX}$`  instead of `pdf $\text{\LaTeX}$`  or ordinary  $\text{\LaTeX}$ . `Lua $\text{\LaTeX}$`  and `X $\text{\LaTeX}$`  handle Unicode input and output natively and can utilize system fonts directly without having to expose them via `.tfm`, `.fd`, and other such files. To output a Unicode character, a `Lua $\text{\LaTeX}$`  or `X $\text{\LaTeX}$`  document can either include that character directly as UTF-8 text or use  $\text{\TeX}$ ’s `\char` primitive, which `Lua $\text{\LaTeX}$ /X $\text{\LaTeX}$`  extends to accept numbers larger than 255.

Suppose we want to output the symbols for versicle (“¥”) and response (“₩”) in a document. The Unicode charts list “versicle” at position U+2123 and “response” at position U+211F. We therefore need to install a font that contains those characters at their proper positions. One such font that is freely available from CTAN is `Junicode` (`Junicode.ttf`) from the `junicode` package. The `fontspec` package makes it easy for a `Lua $\text{\LaTeX}$ /X $\text{\LaTeX}$`  document to utilize a system font. The following example defines a `\textjuni` command that uses `fontspec` to typeset its argument in Junicode:

<sup>12</sup>UTF-8 is the 8-bit Unicode Transformation Format, a popular mechanism for representing Unicode symbol numbers as sequences of one to four bytes.

<sup>13</sup>The Unicode convention is to express character positions as “U+*<hexadecimal number>*”.

---

```
\documentclass{article}
\usepackage{fontspec}

\newcommand{\textjuni}[1]{\fontspec{Junicode}\#1}

\begin{document}
We use ``\textjuni{\char"2123}'' for a versicle
and ``\textjuni{\char"211F}'' for a response.
\end{document}
```

which produces

We use “ $\gamma$ ” for a versicle and “ $\kappa$ ” for a response.

(Typesetting the entire document in Junicode would be even easier. See the `fontspec` documentation for more information regarding font selection.) Note how the preceding example uses `\char` to specify a Unicode character by number. The double quotes before the number indicate that the number is represented in hexadecimal instead of decimal.

## 12.8 About this document

**History** David Carlisle wrote the first version of this document in October, 1994. It originally contained all of the native L<sup>A</sup>T<sub>E</sub>X symbols (Table 53, Table 79, Table 98, Table 153, Table 203, Table 208, Table 244, Table 245, Table 259, Table 270, Table 334, and a few tables that have since been reorganized) and was designed to be nearly identical to the tables in Chapter 3 of Leslie Lamport’s book [Lam86]. Even the table captions and the order of the symbols within each table matched! The *AMS* symbols (Table 54, Table 99, Table 100, Table 156, Table 157, Table 209, Table 218, Table 238, and Table 335) and an initial Math Alphabets table (Table 348) were added thereafter. Later, Alexander Holt provided the `stmaryrd` tables (Table 55, Table 81, Table 101, Table 159, Table 199, and Table 239).

In January, 2001, Scott Pakin took responsibility for maintaining the symbol list and has since implemented a complete overhaul of the document. The result, now called, “The Comprehensive L<sup>A</sup>T<sub>E</sub>X Symbol List”, includes the following new features:

- the addition of a handful of new math alphabets, dozens of new font tables, and thousands of new symbols
- the categorization of the symbol tables into body-text symbols, mathematical symbols, science and technology symbols, dingbats, ancient languages, and other symbols, to provide a more user-friendly document structure
- an index, table of contents, hyperlinks, and a frequently-requested symbol list, to help users quickly locate symbols
- symbol tables rewritten to list the symbols in alphabetical order
- appendices providing additional information relevant to using symbols in L<sup>A</sup>T<sub>E</sub>X
- tables showing how to typeset all of the characters in the ASCII and Latin 1 font encodings

Furthermore, the internal structure of the document has been completely altered from David Carlisle’s original version. Most of the changes are geared towards making the document easier to extend, modify, and reformat.

**Build characteristics** Table 697 on page 387 lists some of this document’s build characteristics. Most important is the list of packages that L<sup>A</sup>T<sub>E</sub>X couldn’t find, but that `symbols.tex` otherwise would have been able to take advantage of. Complete, prebuilt versions of this document are available from CTAN via <https://www.ctan.org/pkg/comprehensive/>. Table 698 shows the package date (specified in the `.sty` file with `\ProvidesPackage`) for each package that was used to build this document and that specifies a package date. Packages are not listed in any particular order in either Table 697 or Table 698.

TABLE 697: Document Characteristics

Characteristic	Value
Source file:	<code>symbols.tex</code>
Build date:	January 3, 2024
Symbols documented:	20323
Packages included:	textcomp latexsym amssymb stmaryrd euscript wasysym pifont manfnt bbding undertilde ifsym tipa tipx extraipa wsipa phonetic uly ar metre txfonts mathabx fclfont skak ascii dingbat skull eurosym esvect yfonts yhmath esint mathdots trsym universa upgreek overrightarrow chemarr chemarrow nath trfsigns abraces mathtools phaistos arcs vietnam t4phonet holtpolt semtrans dictsym extarrows protosem harmony hieroglfccllicenses mathdesign arev MnSymbol fdsymbol boisik cmll extpfeil keystroke fge turnstile simpsons epsdice feyn staves igo colonequals shuffle fourier dozenal pmboxdraw pigpen clock teubner linearA linearB cypriot sarabian GIMP2e harpoon steinmetz milstd recycle DotArrow ushort hhcount ogonek combelow musixtex ccicons adfsymbols adforn bigints soyombo tfruee knitting textgreek begriff frege countriesofeurope cookingsymbols prodint epiolmec mdwmath rsfso fontawesome5 stix hands greenpoint nkarta astrosym webomints moonphase dancers semaphor umranda umrandb cryst starfont tikzsymbols dice apl go magic bartel-chess-fonts actuarialangle <i>lilyglyphs</i> knot bclogo bullcntr rubikcube svrsymbols halloweenmath old-arrows allrunes emf esrelation oplotsymbI cmupint realhats euflag scsnowman endofproofwd mismath musicography rojud utfsym worldflags plimsoll twemojis sacsymb overarrows resmes pdfmsym sillypage academicicons typicons figbas asapsym fontmfizz hamnosys figchild logix pgfornament Icircuit quantikz accents nicefrac xfakebold junicode mathrsfs chancery urwchancal calligra bbold mbboard dsfont bbm dsserif
Packages omitted:	<i>none</i>

TABLE 698: Package versions used in the preparation of this document

Name	Date	Name	Date	Name	Date
textcomp	2020-02-02	latexsym	1998-08-17	amssymb	2013-01-14
stmaryrd	1994-03-03	euscript	2009-06-22	wasysym	2020-01-19
pifont	2020-03-25	manfnt	1999-07-01	bding	1999-04-15
undertilde	2000-08-08	ifsym	2000-04-18	tipa	2002-08-08
tipx	2003-01-01	wsipa	1994-07-16	ar	2012-01-23
metre	2001-12-05	txfonts	2008-01-22	mathabx	2003-07-29
skak	2018-01-08	ascii	2006-05-30	dingbat	2001-04-27
skull	2002-01-23	eurosym	1998-08-06	yfonts	2019-04-04
mathdots	2014-06-11	trsym	2000-06-25	universa	2019-08-26
upgreek	2003-02-12	chemarr	2016-05-16	abraces	2022-11-06
mathtools	2022-06-29	phaistos	2004-04-23	arcs	2004-05-09
t4phonet	2004-06-01	semtrans	1998-02-10	dictsym	2004-07-26
extarrows	2020-03-12	protosem	2005-03-18	harmony	2007-05-04
hieroglf	2015-06-02	cclicenses	2005-05-20	MnSymbol	2007-01-21
fdsymbol	2011-11-01	boisik	2009-08-21	extpfeil	2009-10-31
keystroke	2010-04-23	fge	2015-05-19	turnstile	2007-06-23
epsdice	2007-02-15	feyn	2022-07-20	colonequals	2016-05-16
shuffle	2008-10-27	dozenal	2018-05-11	pmboxdraw	2019-12-05
pigpen	2008-12-07	clock	2001-04-10	teubner	2023-08-25
linearA	2006-03-13	linearb	2005-06-22	cypriot	2009-05-22
sarabian	2005-11-12	Greek2e	1997-06-01	harpoon	1994-11-02
steinmetz	2009-06-14	milstd	2009-06-25	DotArrow	2007-02-12
ushort	2001-06-13	hhcount	1995-03-31	ogonek	1995-07-17
combelow	2010-05-02	musixtex	2001-07-08	ccicons	2017-10-30
adforn	2019-10-13	bigints	2010-02-15	soyombo	1996-09-01
tfruepee	2010-12-15	knitting	2019-04-03	textgreek	2011-10-09
frege	2012-08-04	countriesofeurope	2018-12-29	cookingsymbols	2014-12-28
epiolmec	2003-11-05	mdwmath	1996-04-11	fontawesome5	2022-05-02
stix	2018-04-17	starfont	2010-09-29	tikzsymbols	2021-12-14
actuarialangle	2019-06-13	bclogo	2016-01-10	bullcntr	2007-04-02
rubikcube	2018-02-25	svrsymbols	2019-02-12	halloweenmath	2019-11-01
emf	2016-09-09	oplotstyl	2017-08-04	cmupint	2020-04-13
realhats	2022-06-13	euflag	2020-05-22	scsnowman	2023-02-23
musicography	2023-09-08	rojud	2020-10-25	utfsym	2022-04-17
plimsoll	2020-10-09	twemojis	2021-04-19	sacsymb	2023-02-06
overarrows	2023-02-15	resmes	2022-12-27	sillypage	2023-03-04
academicons	2021-11-26	typicons	2015-05-20	asapsym	2016-03-20
fontmfizz	2017-03-19	hamnosys	2022-02-08	figchild	2022-03-22
logix	2022-06-22	pgfornament	2020-05-26	quantikz	2023-05-24
accents	2006-05-12	nicefrac	1998-08-04	xfakebold	2023-11-21
calligra	2012-04-10				

## 12.9 Copyright and license

The Comprehensive L<sup>A</sup>T<sub>E</sub>X Symbol List  
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<http://www.latex-project.org/lppl.txt>

and version 1.3c or later is part of all distributions of L<sup>A</sup>T<sub>E</sub>X version 2006/05/20 or later.

This work has the LPPL maintenance status “maintained”.

The current maintainer of this work is Scott Pakin.

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# Index

Similar-looking glyphs are compressed into a single index entry with a superscript “<sup>+</sup>” indicating that glyph variations exist. For example, the entry “integral, contour ( $\oint$ )<sup>+</sup>” presents only “ $\oint$ ” but indicates that variations also are available. In this case, those variations are “ $\oint$ ”, and “ $\oint$ ”—essentially font differences along the lines of “A” vs. “A” vs. “A”. Substantially different glyphs with the same name are not merged. For example, both “ $\times$ ” and “ $\prod$ ” are presented for “product”.

Accents are shown over/under a gray box (e.g., “ $\acute{a}$ ” for “accents, acute”). Symbols appearing in a table that spans pages sometimes are associated with all of the pages that table covers. The author hopes to correct this issue in a future version of the Comprehensive L<sup>A</sup>T<sub>E</sub>X Symbol List.

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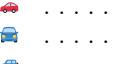
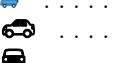
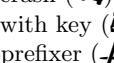
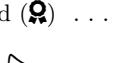
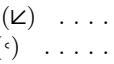
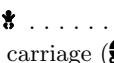
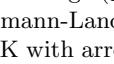
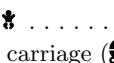
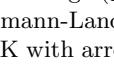
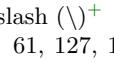
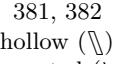
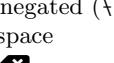
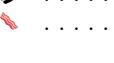
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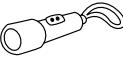
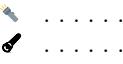
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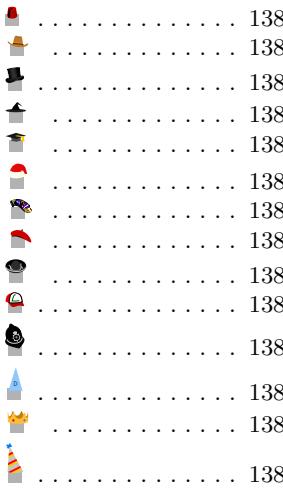
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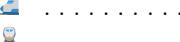
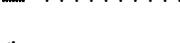
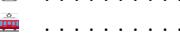
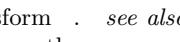
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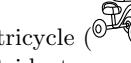
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