Summary of `qsymbols`

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Abstract

qsymbols is a LaTeX [1] package defining systematic mnemonic abbreviations, starting with a single open quote ‘ for symbols, and in double quotes " ... " for arrows, for characters from the amssymb and stmaryrd fonts. Optionally a very large class of arrows can be typeset using the XY-pic package.

Contents

1 Introduction

qsymbols sets up a number of mnemonic and compact abbreviations for math symbols from LaTeX and the packages amssymb and stmaryrd, which it loads. The abbreviations all start with the backquote character ‘ except for arrows that are of the form "->". Some are a single characters, some a more complicated pattern, but always the idea is to use abbreviations that hint at the *visual* appearance of the symbol. Finally it is possible for the user to add more abbreviations of the simpler categories.

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You can retrieve `qsymbols` as well as the `amssymb` and `stmaryrd` packages by anonymous ftp from all CTAN archives in directory `/tex-archive/macros/latex/contrib/supported/`[1] (each package has its own subdirectory).

2 Simple symbols

2.1 Greek letters

All the standard greek letters used in math are available as ` followed by a letter: either lowercase:

x	a	b	c	d	e	f	g	h	i	j	k	l	m	n	p	q	r	s	t	u	v	w	x	y	z
\`x	α	β	χ	δ	ϵ	ϕ	γ	η	ι	ψ	κ	λ	μ	ν	π	θ	ρ	σ	τ	ϱ	φ	ω	ξ	υ	ζ

or uppercase:

X	D	F	G	J	L	P	Q	S	W	X	Y
\`X	Δ	Φ	Γ	Ψ	Λ	Π	Θ	Σ	Ω	Ξ	Υ

2.2 Common symbols

Simple symbols are available using ` followed by a symbolic representation of the symbol. The most common have single character representations:

x	+	*	:	;	/	U	C	_	T	o	.	=	~	E	A	!	^	V
\`x	$\pm$	$\times$	$\in$	$\notin$	$\setminus$	$\cup$	$\mathbb{C}$	$\perp$	$\top$	$\circ$	$\cdot$	$\equiv$	$\simeq$	$\exists$	$\forall$	$\neg$	$\wedge$	$\vee$

2.3 Circled and Boxed Symbols

These are represented using round and square brackets, respectively:

x		+	-	\`*	/	|	\`/	\`.	*	\`o	\`^	\`V	<	>	?	!	:-	R	C	a
\`(x)	$\bigcirc$	$\oplus$	$\ominus$	$\otimes$	$\oslash$	⦶	⦸	$\odot$	$\circledast$	$\circledcirc$	⦵∧	⦵∨	⧀	⧁	$\circ$	$\bullet$	☺	®	©	ⓐ
\`[x]	$\square$	$\boxplus$	$\boxminus$	$\boxtimes$	⧄	◫	⧅	$\boxdot$	⧆	⧇	$\boxed{\wedge}$	$\boxed{\vee}$	$\boxed{<}$	$\boxed{>}$	▫	$\blacksquare$	☹	$\boxed{R}$	$\boxed{C}$	$\boxed{a}$
\`<x>	$\Diamond$														$\diamond$		😐			
\`{x}	$\varnothing$																☹			

As it can be seen, 'undefined' codes of the forms `` `(a) `` and `` `[a] `` result in the contents being circled and boxed, respectively.

2.4 Bold symbols

The $\mathcal{AMS}$-LaTeX `\boldsymbol` command is available by using the special abbreviation `` `@ ``x for the bold version $\boldsymbol{x}$ of x as well as `` `@` ``x where x is on one of the forms described in this section, i.e., `` `@`a `` gives $\boldsymbol{\alpha}$.

2.5 Adding new symbols

Symbols of all the above forms can be added using the form

`\newqsymbol` {\`*code*} {*expansion*}

which makes \`*code* behave as *expansion* in math mode. *code* should be either a single character or some characters enclosed in `()`, `[]`, `<>`, or `{}`.

[1] The 'home' of `qsymbols` is `ftp.diku.dk` in directory `/diku/users/kris/TeX/qsymbols/`.

3 Orderings

Two to four consecutive ‘s indicate an ordering relation:

$\epsilon, \ni$	``ϵ	``/ϵ	``ϵ=	``/ϵ=	```ϵ	````ϵ	``$\ni$	``/$\ni$	``$\ni$=	``/$\ni$=	```$\ni$	````$\ni$
`<,>`	$<$	$\nless$	$\leq$	$\nleq$	$\wedge$	$\bigwedge$	$>$	$\ngtr$	$\geq$	$\ngeq$	$\vee$	$\bigvee$
`(,)`	$\subset$	$\not\subset$	$\subseteq$	$\nsubseteq$	$\cap$	$\bigcap$	$\supset$	$\not\supset$	$\supseteq$	$\nsupseteq$	$\cup$	$\bigcup$
`[,]`	$\sqsubset$	$\not\sqsubset$	$\sqsubseteq$	$\not\sqsubseteq$	$\sqcap$	$\bigsqcap$	$\sqsupset$	$\not\sqsupset$	$\sqsupseteq$	$\not\sqsupseteq$	$\sqcup$	$\bigsqcup$
`\{,\}`	$\prec$	$\nprec$	$\preceq$	$\npreceq$	$\curlywedge$	$\bigcurlywedge$	$\succ$	$\nsucc$	$\succeq$	$\nsucceq$	$\curlyvee$	$\bigcurlyvee$
`\<,\>`	$\lhd$	$\ntriangleleft$	$\unlhd$	$\ntrianglelefteq$	$\vartriangle$	$\bigtriangleup$	$\rhd$	$\ntriangleright$	$\unrhd$	$\ntrianglerighteq$	$\triangledown$	$\bigtriangledown$
`~,\~`	$\sim$	$\nsim$	$\simeq$	$\not\simeq$	$\wr$		$\backsim$	$\not\backsim$	$\backsimeq$	$\not\backsimeq$	$\int$	$\displaystyle\int$
`(-,-)`	$\in$	$\notin$			$\pitchfork$		$\ni$					
`(+,+)`	⪿	$\not$⪿	$\underline{⪿}$	$\not\underline{⪿}$	$\cap\!\!\!\!+$	$\bigcap\!\!\!\!+$	⫀	$\not$⫀	$\underline{⫀}$	$\not\underline{⫀}$	$\uplus$	$\biguplus$

Some abbreviations are provided for convenience:

x	`U`	`V`	`S`	`P`
``x	$\bigcup$	$\bigvee$	$\sum$	$\prod$

There is no simple way to add more orderings.

4 Arrows

Double quotes `"` ... `"` make it possible to typeset arrows. On some systems `"` is reserved for other uses, in that case you can use `‘"` ... `"` instead.

4.1 Canned arrows

The available arrows are shown in figure 1 where ! means that the arrow is available in a long version by adding a `!` just after the stem character (one of `-=`), and ? means that it stretches to accomodate labels (when no `!`s are given, see below).

4.2 Labelling arrows

Inserting `{^`s`}` or `{_`s`}`, where s is a legal super- or subscript, respectively, will typeset these as limits, and even grows it in those cases where the arrow is marked with a “@” in the table.

x	`-{_1}>`	`3>{^{‘a‘.‘b}}`	`<|-|>{_{\mbox{push}}}`
`"`x`"`	$\xrightarrow[1]{}$	$\overset{\alpha\cdot\beta}{\Rrightarrow}$	$\xleftrightarrow[\text{push}]{}$

4.3 Adding new arrows

You can add more ‘canned’ arrows of this kind with commands

`\newqsymbol {"`*arrow*`"} {`*expansion*`}`

which makes `"`*arrow*`"` behave as *expansion* in math mode.

<table>
<tr><td>"<-"</td><td>$\longleftarrow$</td><td>!@</td><td>"<->"</td><td>$\longleftrightarrow$</td><td>!</td><td>"->"</td><td>$\longrightarrow$</td><td>!@</td></tr>
<tr><td>"<="</td><td>$\Longleftarrow$</td><td>!@</td><td>"<=>"</td><td>$\Longleftrightarrow$</td><td>!</td><td>"=>"</td><td>$\Longrightarrow$</td><td>!@</td></tr>
<tr><td>"<3"</td><td>$\Lleftarrow$</td><td>@</td><td></td><td></td><td></td><td>"3>"</td><td>$\Rrightarrow$</td><td>@</td></tr>
<tr><td>"</-"</td><td>$\not\longleftarrow$</td><td></td><td>"</->"</td><td>$\not\longleftrightarrow$</td><td></td><td>"-/>"</td><td>$\not\longrightarrow$</td><td></td></tr>
<tr><td>"</="</td><td>$\not\Longleftarrow$</td><td></td><td>"</=>"</td><td>$\not\Longleftrightarrow$</td><td></td><td>"=/>"</td><td>$\not\Longrightarrow$</td><td></td></tr>
<tr><td>"^<-"</td><td>$\leftharpoonup$</td><td></td><td></td><td></td><td></td><td>"^->"</td><td>$\rightharpoonup$</td><td></td></tr>
<tr><td>"_<-"</td><td>$\leftharpoondown$</td><td></td><td></td><td></td><td></td><td>"_->"</td><td>$\rightharpoondown$</td><td></td></tr>
<tr><td>"<-|"</td><td>$\longmapsfrom$</td><td>!@</td><td></td><td></td><td></td><td>"|->"</td><td>$\longmapsto$</td><td>!@</td></tr>
<tr><td>"<=|"</td><td>$\Longmapsfrom$</td><td>!@</td><td></td><td></td><td></td><td>"|=>"</td><td>$\Longmapsto$</td><td>!@</td></tr>
<tr><td>"<-’"</td><td>$\hookleftarrow$</td><td>@</td><td></td><td></td><td></td><td>"‘->"</td><td>$\hookrightarrow$</td><td>@</td></tr>
<tr><td>"<-<"</td><td>$\leftarrowtail$</td><td></td><td></td><td></td><td></td><td>">->"</td><td>$\rightarrowtail$</td><td></td></tr>
<tr><td>"<|-"</td><td>$\leftarrowtriangle$</td><td>@</td><td>"<|-|>"</td><td>$\leftrightarrowtriangle$</td><td>@</td><td>"-|>"</td><td>$\rightarrowtriangle$</td><td>@</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td><td>"-o"</td><td>$\multimap$</td><td>@</td></tr>
<tr><td>"<--"</td><td>$\dashleftarrow$</td><td></td><td></td><td></td><td></td><td>"-->"</td><td>$\dashrightarrow$</td><td></td></tr>
<tr><td></td><td></td><td></td><td>"<~>"</td><td>$\leftrightsquigarrow$</td><td></td><td>"~>"</td><td>$\rightsquigarrow$</td><td></td></tr>
<tr><td>"<<-"</td><td>$\twoheadleftarrow$</td><td>@</td><td></td><td></td><td></td><td>"->>"</td><td>$\twoheadrightarrow$</td><td>@</td></tr>
<tr><td>"<<="</td><td>$\Lleftarrow$</td><td>@</td><td></td><td></td><td></td><td>"=>>"</td><td>$\Rrightarrow$</td><td>@</td></tr>
<tr><td>"|-"</td><td>$\vdash$</td><td></td><td>"|/-"</td><td>$\nvdash$</td><td></td><td>"-|"</td><td>$\dashv$</td><td></td></tr>
<tr><td>"|="</td><td>$\vDash$</td><td></td><td>"|/="</td><td>$\nvDash$</td><td></td><td></td><td></td><td></td></tr>
<tr><td>"||-"</td><td>$\Vdash$</td><td></td><td>"||/-"</td><td>$\nVdash$</td><td></td><td></td><td></td><td></td></tr>
</table>

Figure 1: Standard ‘canned’ arrow symbols.

Similarly, you can add stretchable arrows using commands of the form

`\newqsymbol {"`*arrow*`@"} {`*filler*`}`

which makes `"`*arrow*`"` stretch under long labels as *filler* dictates: this should behave as the plain TEX command `\rightarrowfill` or use the macro

`\genericarrowfill{`*tail*`}{`*leader*`}{`*head*`}`

`qsymbols` includes, for example, the declaration

```
\newqsymbol{"3>@"}{\genericarrowfill\equiv\equiv\Rrightarrow}
```

4.4 Using XY-pic for arrows

If the option `[xy]` is used in the `\usepackage` command, or if XY-pic [3][2] is already loaded, then the XY-pic arrow feature (with the ‘cmtip’ extension) is used to allow a much more general class of arrows.

First, all blank entries in figure 1 are filled; if the option `[purexy]` is used instead of `[xy]` then all the entries of the table are replaces with XY-pic generated arrows (this gives a somewhat more homogenous look and avoids loading of `ams` and `stmary` arrows).

Second, general arrows can be constructed according to the following rules:

- Basic arrows are composed by combining the variants `23^_`, the tips `<>|xo‘’`, and the connectors `-=.:~`.

[2] XY-pic version 3 is needed for this to work.

- The character `/` 'negates' the arrow (once or twice) similar to the way `\not` does for relations:

x	`` `-/> ``	`=//!>`
"x"	$\not\hookrightarrow$	$\not\not\Longrightarrow$

- Each `!` character makes the arrow a bit longer.

x	`->`	`-!>`	`-!!>`	`-!!!>`
"x"	$\to$	$\longrightarrow$	$\longrightarrow$	$\longrightarrow$

  Note: Some arrows are automatically made a bit longer, e.g., the `<~>` arrow shown above.

- The form `*`*object* inserts the XY-pic *object* which will be used for the tail, shaft, or tip as indicated by the position. Here are some examples:

x	`*{x}-*{y}!`	`*{}*{*}|!!`
"x"	x—y	****|

  as in the examples it is recommended to specify all three of tail, shaft, and head, when using this, in particular an empty tail when the shaft is specified with `*` because otherwise it is taken as the tail.

- The forms `(`x`)` and `[`x`]` insert a break with x in a circle and box, respectively:

x	`(1)>`	`[1]>>`
"x"	—1→	—$\boxed{1}$↠

- The special code `{`ℓ`}` adds the ℓ material to the end of the XY-pic arrow: All XY-pic ⟨labels⟩ can be used as described in [3, §16], for example,

x	`={|{`b}}!!|>`
"x"	$=\beta\Rightarrow$

  Use this with care!

- Similarly the special code `@{`ℓ`}` adds the `@`ℓ material (note the omission of the braces) to the beginning of the XY-pic arrow: all XY-pic arrow ⟨form⟩s can be used ¡form¿ to the beginning of the arrow specification; this can be used to as described in [3, §16], for example,

x	`|-@{/^/}!!!>|`	`->!!!!@{(dr,ul)}`
"x"		

  Use this with care!

4.5 Using `qsymbols` arrows in XY-pic diagrams

Finally it is possible to some extent to use `qsymbols` arrows in XY-pic matrices (as described in the XY-pic User's Guide [2]) and graphs (as described in the XY-pic Reference Manual [3, §19]). First notice that you should always use the `` `" ... " `` form. Second, the entire `` `" ... " `` construction behaves as an arrow made with `\ar` for matrices and `:` for graphs, that is, you must add a 'target address' for the arrow after it. Further information of this can be found

Here is the canonical pull-back example diagram from category theory typeset using qsymbols:

```
\xymatrix{
 U `"->"@/_/[ddr]_y `".>"[dr]|-{(x,y)} `"->"@/^/[drr]^x \\
  & X \times_Z Y `"=>"[d]^q `"=>"[r]_p & X `"=>"[d]_f   \\
  & Y `"=>"[r]^g                       & Z              }
```

typesets

$$\begin{tikzcd}
U \arrow[ddr, bend right, "y"'] \arrow[dr, dotted, "{(x,y)}" description] \arrow[drr, bend left, "x"] & & \\
 & X \times_Z Y \arrow[d, Rightarrow, "q"] \arrow[r, Rightarrow, "p"'] & X \arrow[d, Rightarrow, "f"'] \\
 & Y \arrow[r, Rightarrow, "g"] & Z
\end{tikzcd}$$

As you can see, XY-pic is loaded by `qsymbols` and as a convenience XY-pic options may be passed to `qsymbols`.

References

[1] Leslie Lamport. *LaTeX—A Document Preparation System.* Addison-Wesley, 2nd edition, 1994.

[2] Kristoffer H. Rose. XY-pic user's guide. Mathematics Report 94–148, MPCE, Macquarie University, NSW 2109, Australia, June 1994. For version 2.10+. Latest version available with URL `ftp://ftp.diku.dk/diku/users/kris/TeX/xy/xyguide.ps`.

[3] Kristoffer H. Rose and Ross Moore. XY-pic reference manual. Mathematics Report 94–155, MPCE, Macquarie University, NSW 2109, Australia, June 1994. For version 2.10+. Latest version available by anonymous ftp in `ftp.diku.dk: /diku/users/kris/TeX/xyrefer.ps.Z`.