3.9   List of Mathematical Symbols

In the following tables, you find all the symbols normally accessible from *math mode.*

To use the symbols listed in Tables 3.12–3.16,[6] the package amssymb must be loaded in the preamble of the document and the AMS math fonts must be installed, on the system. If the AMS package and fonts are not installed, on your system, have a look at

CTAN:/tex-archive/macros/latex/packages/amslatex

Table 3.1: Math Mode Accents.

$\hat{a}$	\hat{a}	$\check{a}$	\check{a}	$\tilde{a}$	\tilde{a}	$\acute{a}$	\acute{a}
$\grave{a}$	\grave{a}	$\dot{a}$	\dot{a}	$\ddot{a}$	\ddot{a}	$\breve{a}$	\breve{a}
$\bar{a}$	\bar{a}	$\vec{a}$	\vec{a}	$\widehat{A}$	\widehat{A}	$\widetilde{A}$	\widetilde{A}

Table 3.2: Lowercase Greek Letters.

α	\alpha	θ	\theta	o	o	υ	\upsilon
β	\beta	ϑ	\vartheta	π	\pi	ϕ	\phi
γ	\gamma	ι	\iota	ϖ	\varpi	φ	\varphi
δ	\delta	κ	\kappa	ρ	\rho	χ	\chi
ϵ	\epsilon	λ	\lambda	ϱ	\varrho	ψ	\psi
ε	\varepsilon	μ	\mu	σ	\sigma	ω	\omega
ζ	\zeta	ν	\nu	ς	\varsigma		
η	\eta	ξ	\xi	τ	\tau		

Table 3.3: Uppercase Greek Letters.

Γ	\Gamma	Λ	\Lambda	Σ	\Sigma	Ψ	\Psi
Δ	\Delta	Ξ	\Xi	Υ	\Upsilon	Ω	\Omega
Θ	\Theta	Π	\Pi	Φ	\Phi		

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[6]These tables were derived from symbols.tex by David Carlisle and subsequently changed extensively as suggested by Josef Tkadlec.

Table 3.4: Binary Relations.

You can produce corresponding negations by adding a `\not` command as prefix to the following symbols.

$<$	`<`	$>$	`>`	$=$	`=`
$\leq$	`\leq` or `\le`	$\geq$	`\geq` or `\ge`	$\equiv$	`\equiv`
$\ll$	`\ll`	$\gg$	`\gg`	$\doteq$	`\doteq`
$\prec$	`\prec`	$\succ$	`\succ`	$\sim$	`\sim`
$\preceq$	`\preceq`	$\succeq$	`\succeq`	$\simeq$	`\simeq`
$\subset$	`\subset`	$\supset$	`\supset`	$\approx$	`\approx`
$\subseteq$	`\subseteq`	$\supseteq$	`\supseteq`	$\cong$	`\cong`
$\sqsubset$	`\sqsubset` [a]	$\sqsupset$	`\sqsupset` [a]	$\bowtie$	`\Join` [a]
$\sqsubseteq$	`\sqsubseteq`	$\sqsupseteq$	`\sqsupseteq`	$\bowtie$	`\bowtie`
$\in$	`\in`	$\ni$	`\ni` , `\owns`	$\propto$	`\propto`
$\vdash$	`\vdash`	$\dashv$	`\dashv`	$\models$	`\models`
$\mid$	`\mid`	$\parallel$	`\parallel`	$\perp$	`\perp`
$\smile$	`\smile`	$\frown$	`\frown`	$\asymp$	`\asymp`
$:$	`:`	$\notin$	`\notin`	$\neq$	`\neq` or `\ne`

[a]Use the latexsym package to access this symbol

Table 3.5: Binary Operators.

$+$	`+`	$-$	`-`		
$\pm$	`\pm`	$\mp$	`\mp`	$\triangleleft$	`\triangleleft`
$\cdot$	`\cdot`	$\div$	`\div`	$\triangleright$	`\triangleright`
$\times$	`\times`	$\setminus$	`\setminus`	$\star$	`\star`
$\cup$	`\cup`	$\cap$	`\cap`	$\ast$	`\ast`
$\sqcup$	`\sqcup`	$\sqcap$	`\sqcap`	$\circ$	`\circ`
$\vee$	`\vee` , `\lor`	$\wedge$	`\wedge` , `\land`	$\bullet$	`\bullet`
$\oplus$	`\oplus`	$\ominus$	`\ominus`	$\diamond$	`\diamond`
$\odot$	`\odot`	$\oslash$	`\oslash`	$\uplus$	`\uplus`
$\otimes$	`\otimes`	$\bigcirc$	`\bigcirc`	$\amalg$	`\amalg`
$\bigtriangleup$	`\bigtriangleup`	$\bigtriangledown$	`\bigtriangledown`	$\dagger$	`\dagger`
$\lhd$	`\lhd` [a]	$\rhd$	`\rhd` [a]	$\ddagger$	`\ddagger`
$\unlhd$	`\unlhd` [a]	$\unrhd$	`\unrhd` [a]	$\wr$	`\wr`

Table 3.6: BIG Operators.

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

Table 3.7: Arrows.

$\leftarrow$	\leftarrow or \gets	$\longleftarrow$	\longleftarrow	$\uparrow$	\uparrow
$\rightarrow$	\rightarrow or \to	$\longrightarrow$	\longrightarrow	$\downarrow$	\downarrow
$\leftrightarrow$	\leftrightarrow	$\longleftrightarrow$	\longleftrightarrow	$\updownarrow$	\updownarrow
$\Leftarrow$	\Leftarrow	$\Longleftarrow$	\Longleftarrow	$\Uparrow$	\Uparrow
$\Rightarrow$	\Rightarrow	$\Longrightarrow$	\Longrightarrow	$\Downarrow$	\Downarrow
$\Leftrightarrow$	\Leftrightarrow	$\Longleftrightarrow$	\Longleftrightarrow	$\Updownarrow$	\Updownarrow
$\mapsto$	\mapsto	$\longmapsto$	\longmapsto	$\nearrow$	\nearrow
$\hookleftarrow$	\hookleftarrow	$\hookrightarrow$	\hookrightarrow	$\searrow$	\searrow
$\leftharpoonup$	\leftharpoonup	$\rightharpoonup$	\rightharpoonup	$\swarrow$	\swarrow
$\leftharpoondown$	\leftharpoondown	$\rightharpoondown$	\rightharpoondown	$\nwarrow$	\nwarrow
$\rightleftharpoons$	\rightleftharpoons	$\Longleftrightarrow$	\iff (bigger spaces)	$\leadsto$	\leadsto [a]

[a]Use the latexsym package to access this symbol

Table 3.8: Delimiters.

(	(	)	)	$\uparrow$	\uparrow	$\Uparrow$	\Uparrow
[	[or \lbrack	]	] or \rbrack	$\downarrow$	\downarrow	$\Downarrow$	\Downarrow
{	\{ or \lbrace	}	\} or \rbrace	$\updownarrow$	\updownarrow	$\Updownarrow$	\Updownarrow
$\langle$	\langle	$\rangle$	\rangle	$\vert$		or \vert	$\Vert$	| or \Vert
$\lfloor$	\lfloor	$\rfloor$	\rfloor	$\lceil$	\lceil	$\rceil$	\rceil
/	/	$\backslash$	\backslash		. (dual. empty)		

Table 3.9: Large Delimiters.

$\lgroup$	\lgroup	$\rgroup$	\rgroup	$\lmoustache$	\lmoustache	$\rmoustache$	\rmoustache
$\arrowvert$	\arrowvert	$\Arrowvert$	\Arrowvert	$\bracevert$	\bracevert		

Table 3.10: Miscellaneous Symbols.

...	\dots	⋯	\cdots	⋮	\vdots	⋰	\ddots
ℏ	\hbar	ι	\imath	ȷ	\jmath	ℓ	\ell
ℜ	\Re	ℑ	\Im	ℵ	\aleph	℘	\wp
∀	\forall	∃	\exists	℧	\mho [a]	∂	\partial
′	,	′	\prime	∅	\emptyset	∞	\infty
∇	\nabla	△	\triangle	□	\Box [a]	◇	\Diamond [a]
⊥	\bot	⊤	\top	∠	\angle	√	\surd
◇	\diamondsuit	♡	\heartsuit	♣	\clubsuit	♠	\spadesuit
¬	\neg or \lnot	♭	\flat	♮	\natural	♯	\sharp

[a]Use the latexsym package to access this symbol

Table 3.11: Non-Mathematical Symbols.

These symbols can also be used in text mode.

†	\dag	§	\S	©	\copyright
‡	\ddag	¶	\P	£	\pounds

Table 3.12: AMS Delimiters.

⌜	\ulcorner	⌝	\urcorner	⌞	\llcorner	⌟	\lrcorner

Table 3.13: AMS Greek and Hebrew.

ϝ	\digamma	ϰ	\varkappa	ℶ	\beth	ℸ	\daleth	ℷ	\gimel

Table 3.14: AMS Binary Relations.

⋖	\lessdot	⋗	\gtrdot	≑	\doteqdot or \Doteq
⩽	\leqslant	⩾	\geqslant	≓	\risingdotseq
⪕	\eqslantless	⪖	\eqslantgtr	≒	\fallingdotseq
≦	\leqq	≧	\geqq	≖	\eqcirc
⋘	\lll or \llless	⋙	\ggg or \gggtr	≗	\circeq
≲	\lesssim	≳	\gtrsim	≜	\triangleq
⪅	\lessapprox	⪆	\gtrapprox	≏	\bumpeq
≶	\lessgtr	≷	\gtrless	≎	\Bumpeq
⪋	\lesseqgtr	⪌	\gtreqless	∼	\thicksim
⪛	\lesseqqgtr	⪜	\gtreqqless	≈	\thickapprox
≼	\preccurlyeq	≽	\succcurlyeq	≊	\approxeq
⋞	\curlyeqprec	⋟	\curlyeqsucc	∽	\backsim
≾	\precsim	≿	\succsim	⋍	\backsimeq
⪷	\precapprox	⪸	\succapprox	⊨	\vDash
⊆	\subseteqq	⊇	\supseteqq	⊩	\Vdash
⋐	\Subset	⋑	\Supset	⊪	\Vvdash
⊏	\sqsubset	⊐	\sqsupset	϶	\backepsilon
∴	\therefore	∵	\because	∝	\varpropto
∣	\shortmid	∥	\shortparallel	≬	\between
⌣	\smallsmile	⌢	\smallfrown	⋔	\pitchfork
◁	\vartriangleleft	▷	\vartriangleright	◀	\blacktriangleleft
⊴	\trianglelefteq	⊵	\trianglerighteq	▶	\blacktriangleright

Table 3.15: AMS Arrows.

⇠	\dashleftarrow	⇢	\dashrightarrow	⊸	\multimap
⇇	\leftleftarrows	⇉	\rightrightarrows	⇈	\upuparrows
⇆	\leftrightarrows	⇄	\rightleftarrows	⇊	\downdownarrows
⇚	\Lleftarrow	⇛	\Rrightarrow	↿	\upharpoonleft
↞	\twoheadleftarrow	↠	\twoheadrightarrow	↾	\upharpoonright
↢	\leftarrowtail	↣	\rightarrowtail	⇃	\downharpoonleft
⇋	\leftrightharpoons	⇌	\rightleftharpoons	⇂	\downharpoonright
↰	\Lsh	↱	\Rsh	⇝	\rightsquigarrow
↫	\looparrowleft	↬	\looparrowright	↭	\leftrightsquigarrow
↶	\curvearrowleft	↷	\curvearrowright		
↺	\circlearrowleft	↻	\circlearrowright		

Table 3.16: AMS Negated Binary Relations and Arrows.

≮	\nless	≯	\ngtr	⊊	\varsubsetneqq
≨	\lneq	≩	\gneq	⊋	\varsupsetneqq
≰	\nleq	≱	\ngeq	⊈	\nsubseteqq
⪇	\nleqslant	⪈	\ngeqslant	⊉	\nsupseteqq
≨	\lneqq	≩	\gneqq	∤	\nmid
⪇	\lvertneqq	⪈	\gvertneqq	∦	\nparallel
≰	\nleqq	≱	\ngeqq	∤	\nshortmid
⋦	\lnsim	⋧	\gnsim	∦	\nshortparallel
⪉	\lnapprox	⪊	\gnapprox	≁	\nsim
⊀	\nprec	⊁	\nsucc	≇	\ncong
⪯̸	\npreceq	⪰̸	\nsucceq	⊬	\nvdash
⪵	\precneqq	⪶	\succneqq	⊭	\nvDash
⋨	\precnsim	⋩	\succnsim	⊮	\nVdash
⪹	\precnapprox	⪺	\succnapprox	⊯	\nVDash
⊊	\subsetneq	⊋	\supsetneq	⋪	\ntriangleleft
⊊	\varsubsetneq	⊋	\varsupsetneq	⋫	\ntriangleright
⊄	\nsubseteq	⊅	\nsupseteq	⋬	\ntrianglelefteq
⊊	\subsetneqq	⊋	\supsetneqq	⋭	\ntrianglerighteq
↚	\nleftarrow	↛	\nrightarrow	↮	\nleftrightarrow
⇍	\nLeftarrow	⇏	\nRightarrow	⇎	\nLeftrightarrow

Table 3.17: AMS Binary Operators.

∔	\dotplus	⋅	\centerdot	⊺	\intercal
⋉	\ltimes	⋊	\rtimes	⊛	\divideontimes
⋓	\Cup or \doublecup	⋒	\Cap or \doublecap	∖	\smallsetminus
⊻	\veebar	⊼	\barwedge	⩞	\doublebarwedge
⊞	\boxplus	⊟	\boxminus	⊝	\circleddash
⊠	\boxtimes	⊡	\boxdot	⊚	\circledcirc
⋋	\leftthreetimes	⋌	\rightthreetimes	⊛	\circledast
⋎	\curlyvee	⋏	\curlywedge		

Table 3.18: AMS Miscellaneous.

ℏ	\hbar	ℏ	\hslash	𝕜	\Bbbk
□	\square	∎	\blacksquare	Ⓢ	\circledS
△	\vartriangle	▲	\blacktriangle	∁	\complement
▽	\triangledown	▼	\blacktriangledown	⅁	\Game
◊	\lozenge	◆	\blacklozenge	★	\bigstar
∠	\angle	∡	\measuredangle	⊲	\sphericalangle
╱	\diagup	╲	\diagdown	∖	\backprime
∄	\nexists	⅂	\Finv	∅	\varnothing
ð	\eth	℧	\mho		

Table 3.19: Math Alphabets.

Example	Command	Required package
ABCdef	\mathrm{ABCdef}	
ABCdef	\mathit{ABCdef}	
ABCdef	\mathnormal{ABCdef}	
𝒜ℬ𝒞	\mathcal{ABC}	
𝒜ℬ𝒞	\mathcal{ABC}	mathrsfs
𝒜ℬ𝒞	\mathcal{ABC}	eucal with option: mathcal or
	\mathscr{ABC}	eucal with option: mathscr
𝔄𝔅ℭ𝔡𝔢𝔣	\mathfrak{ABCdef}	eufrak
𝔸𝔹ℂ	\mathbb{ABC}	amsfonts or amssymb