Informations and tests

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The mathabx series are a large mathematical symbols set designed and defined in MetaFont language. Many common and uncommon symbols can be found in these series. These programs are intended to produce bitmap fonts and a lot of care is given about rasterization. Encoding, metrics, designs are not supposed to be frozen since improvements, changes of mind can always happen. Thus, *this distribution is still (May 18, 2005) at a "merely for evaluation" level.* Please check my home page to get the last updates:

`http://www-math.univ-poitiers.fr/~phan/metafont.html`

By now, there are three main series of fonts: *matha*, *mathb* and *mathx*. The *matha* series consist in quite usual mathematical symbols, more precisely they contain the, say, 64 mathematical symbols one can use and suppose other ones know their meaning. The *mathb* series is a kind of twin of *matha*, but it is the one people should not show outside of the house: these symbols do not have a very well known meaning and, thus, should not be used. The *mathx* series is the set of extensible delimiters and large operators fitting *matha* and *mathb*; its encoding doesn't match at all the *cmex* one, but it may change in the future.

Since a metafont designer doesn't always know when to stop creating or coding stuff, many pieces of code remained once the three former series where filled. The remaining stuff has been put in *mathu* (*u* stands for unsupported) and in *mathux* (*ux* stands for unsupported extensible). There is also "work in progress"-material: some full OT1 implementation of calligraphic characters. If this last task find an end, there would be a *mathc* series—where *c* would stand for calligraphic.

The translation of this document into english is not yet finished. We do apologize for this.

Progress

April 29, 2002. First posting on CTAN.

June 19, 2002. A few changes have been done:
- Some large symbols are now thicker (`\bigcup`, etc.);
- "Flat cups" have been introduced (`\bigcup`, etc.), that means that the roundish parts of those symbols are now "flatter".

November 16, 2002.
- Some work has been done on the calligraphic set. The uppercase subset should be exactly the *Computer Modern*'s one. So kerning has to be done in order to get a nice stuff.
- The series *mathux* are in progress. It will contain more extensible symbols (unnecessary I think, so still unsupported).

- Binary operators `\sprod` and `\scoprod` have been added to *matha* at locations `"3C` and `"3D`. I love those symbols and I believe that they must lie on the main symbols series.

July 29, 2003.
- Some LaTeX bugs have been fixed in `mathabx.dcl` with the help of some very kind users (Patrick Cousot, Hung N. Duong, Kohsaku Hotta).
- The file `mathgrey.mf` is no longer used. This means that `mathu10` has no more grey characters. It seems that those characters are not compatible with some postscript or such translation (with `TeXtrace` for instance).
- The LaTeX style file `mathabx.sty` allows options which are *matha*, *mathb* and *mathx*. These options define which series will be used. If no option is given, the three series will be used. (The plainTeX file `mathabx.tex` does not allow anything of this kind.)

October 23, 2003.
- The `\bar` and `\widebar` accents have changed of height (which is now smaller).
- Arrows have a wider breadth and a lighter head.
- A little work on calligraphic digits has been done.
- Double brackets formerly named `\lbbbrack` and `\rbbbrack` are now named `\ldbrack` and `\rdbrack`, and they still have their curious aliases `\lsemantic` and `\rsemantic`.

May 18, 2005.
- I didn't pay attention until recently to the fact that square roots may appear also in `\scriptstyle` and `\scriptscriptstyle` modes. This makes necessary to make the corresponding symbols go across some usual symbols set and the extensible characters set. This is repaired: a basic radical symbol now lies in *matha* at location `"37`. In fact, the former basic radical symbol in *mathx* still exists at place `"60` and there was no problem if *mathx* is used in 3 different sizes.
- The `\bar` and `\widebar` accents have been restored to their former heights.
- Large greek like symbols (sums, products, coproducts) have been revised. Text-style product and coproduct widths have been increased by $u\#$. Also, in *matha*, small sum, product, coproduct have changed of encoding since the small sum has been introduced.
- *mathc* has finally been introduced. It is still an uncomplete calligraphic set. Also existing glyphs may be revised.
- Integrals have been revised. Comments are welcome.
- Astronomical/logical symbols are in progress.
- PlainTeX/LaTeX files have been revised.

1. List of every mathabx' symbols

Thereafter will be loaded plainTeX definitions files related to these fonts families. Assigning any value to the control sequence `\proofmode` like `\let\proofmode=!`, for instance, the definition of every symbol will be made together with the printing of the related informations. The control sequence `\proofmode` will be reset to `\undefined` at the end of the loading. This can be helpful for instantaneous documentation.

About the names of the different control sequences, we mostly tried to conform to the usual names. If in the following there is some apparent mismatch with *AMS* denomination, it is normally supported. Below is printed first the symbol, then if it already exists the *Computer Modern* or *AMS* one, the name of the control sequence, in exponent the spacing value of the symbol ("other" means that it is an accent or such, it does not really matter), at last—if any—its aliases.

Specials (matha/mathb)

$\vert$		\notsign$^{\text{rel}}$	$/$		\varnotsign$^{\text{rel}}$
$\cdot$	$\cdot$	\cdotp$^{\text{punct}}$			

Usual binary operators (matha)

$+$	$+$	+$^{\text{bin}}$	$-$	$-$	-$^{\text{bin}}$
$\times$	$\times$	\times$^{\text{bin}}$	$\div$	$\div$	\div$^{\text{bin}}$
$\cdot$	$\cdot$	\cdot$^{\text{bin}}$	$\circ$	$\circ$	\circ$^{\text{bin}}$
$*$	$*$	*$^{\text{bin}}$	$\ast$	$\ast$	\ast$^{\text{bin}}$
$*$		\asterisk$^{\text{ord}}$			\coasterisk$^{\text{bin}}$
$\pm$	$\pm$	\pm$^{\text{bin}}$	$\mp$	$\mp$	\mp$^{\text{bin}}$
$\ltimes$	$\ltimes$	\ltimes$^{\text{bin}}$	$\rtimes$	$\rtimes$	\rtimes$^{\text{bin}}$
$\diamond$	$\diamond$	\diamond$^{\text{bin}}$	$\bullet$	$\bullet$	\bullet$^{\text{bin}}$
$\star$	$\star$	\star$^{\text{bin}}$			\varstar$^{\text{bin}}$
Σ		\ssum$^{\text{bin}}$	Π		\sprod$^{\text{bin}}$
$\amalg$	$\amalg$	\amalg$^{\text{bin}}$, \scoprod			

Unusual binary operators (mathb)

$\dotplus$	$\dotplus$	\dotplus$^{\text{bin}}$			\dotdiv$^{\text{bin}}$
$\dot\times$		\dottimes$^{\text{bin}}$			\divdot$^{\text{bin}}$
$\cdot$		\udot$^{\text{bin}}$	$\square$	$\square$	\square$^{\text{bin}}$
		\Asterisk$^{\text{bin}}$			\bigast$^{\text{op}}$
		\coAsterisk$^{\text{bin}}$			\bigcoast$^{\text{op}}$
		\circplus$^{\text{bin}}$			\pluscirc$^{\text{bin}}$
		\convolution$^{\text{bin}}$	$\divideontimes$	$\divideontimes$	\divideontimes$^{\text{bin}}$
$\blacklozenge$		\blackdiamond$^{\text{bin}}$	$\blacksquare$		\sqbullet$^{\text{bin}}$, \centerdot
$\bigstar$	$\bigstar$	\bigstar$^{\text{bin}}$			\bigvarstar$^{\text{bin}}$

Usual relations (matha)

$=$	$=$	=$^{\text{rel}}$	$\equiv$	$\equiv$	\equiv$^{\text{rel}}$
$\sim$	$\sim$	\sim$^{\text{rel}}$	$\approx$	$\approx$	\approx$^{\text{rel}}$
$\simeq$	$\simeq$	\simeq$^{\text{rel}}$	$\cong$	$\cong$	\cong$^{\text{rel}}$
$\asymp$	$\asymp$	\asymp$^{\text{rel}}$	$\vert$		\divides$^{\text{rel}}$
$\neq$	$\neq$	\neq$^{\text{rel}}$, \ne	$\not\equiv$		\notequiv$^{\text{rel}}$, \nequiv
$\nsim$	$\nsim$	\nsim$^{\text{rel}}$	$\not\approx$		\napprox$^{\text{rel}}$
$\not\simeq$		\nsimeq$^{\text{rel}}$	$\ncong$	$\ncong$	\ncong$^{\text{rel}}$
$\not\asymp$		\notasymp$^{\text{rel}}$	$\nmid$		\notdivides$^{\text{rel}}$, \ndivides

Unusual relations (mathb)

$\doteq$		\topdoteq$^{\text{rel}}$			\botdoteq$^{\text{rel}}$
$\doteqdot$		\dotseq$^{\text{rel}}$, \doteqdot, \Doteq	$\risingdotseq$	$\risingdotseq$	\risingdotseq$^{\text{rel}}$
$\fallingdotseq$	$\fallingdotseq$	\fallingdotseq$^{\text{rel}}$	$\coloneq$		\coloneq$^{\text{rel}}$
$\eqcolon$		\eqcolon$^{\text{rel}}$	$\bumpeq$		\bumpedeq$^{\text{rel}}$
		\eqbumped$^{\text{rel}}$	$\Bumpeq$		\Bumpedeq$^{\text{rel}}$

≗	≗	\circeq$^{\text{rel}}$	≖	≖	\eqcirc$^{\text{rel}}$
≜	≜	\triangleq$^{\text{rel}}$	≙		\corresponds$^{\text{rel}}$

Miscellaneous (matha)

¬	¬	\neg$^{\text{ord}}$, \lnot	≪	≪	\ll$^{\text{rel}}$
≫	≫	\gg$^{\text{rel}}$	⋕		\hash$^{\text{ord}}$
⊢	⊢	\vdash$^{\text{rel}}$	⊣	⊣	\dashv$^{\text{rel}}$
⊬	⊬	\nvdash$^{\text{rel}}$	⊣̸		\ndashv$^{\text{rel}}$
⊨	⊨	\vDash$^{\text{rel}}$	⫤		\Dashv$^{\text{rel}}$
⊭	⊭	\nvDash$^{\text{rel}}$	⫤̸		\nDashv$^{\text{rel}}$
⊩	⊩	\Vdash$^{\text{rel}}$	⫣		\dashV$^{\text{rel}}$
⊮	⊮	\nVdash$^{\text{rel}}$	⫣̸		\ndashV$^{\text{rel}}$
○		\degree$^{\text{ord}}$	′	′	\prime$^{\text{ord}}$
″		\second$^{\text{ord}}$	‴		\third$^{\text{ord}}$
⁗		\fourth$^{\text{ord}}$	♭	♭	\flat$^{\text{ord}}$
♮	♮	\natural$^{\text{ord}}$	♯	♯	\sharp$^{\text{ord}}$
∞	∞	\infty$^{\text{ord}}$	∝	∝	\propto$^{\text{ord}}$
†	†	\dagger$^{\text{ord}}$	‡	‡	\ddagger$^{\text{ord}}$

Miscellaneous (mathb)

≬	≬	\between$^{\text{rel}}$	⌣	⌣	\smile$^{\text{rel}}$
⌢	⌢	\frown$^{\text{rel}}$	#		\varhash$^{\text{ord}}$
⋋	⋋	\leftthreetimes$^{\text{ord}}$	⋌	⋌	\rightthreetimes$^{\text{ord}}$
⋔	⋔	\pitchfork$^{\text{ord}}$	⋈	⋈	\bowtie$^{\text{rel}}$, \Join
⊫		\VDash$^{\text{rel}}$	⫥		\DashV$^{\text{rel}}$
⊯	⊯	\nVDash$^{\text{rel}}$	⫥̸		\nDashV$^{\text{rel}}$
⊪	⊪	\Vvdash$^{\text{rel}}$	⊣⦀		\dashVv$^{\text{rel}}$
⊪̸		\nVvash$^{\text{rel}}$	⊣̸⦀		\ndashVv$^{\text{rel}}$
∴	∴	\therefore$^{\text{rel}}$	∵	∵	\because$^{\text{rel}}$
˚		\ring$^{\text{other}}$	˙		\dot$^{\text{other}}$
¨		\ddot$^{\text{other}}$	⋯		\dddot$^{\text{other}}$
····		\ddddot$^{\text{other}}$	∠	∠	\angle$^{\text{ord}}$
∡	∡	\measuredangle$^{\text{ord}}$	∢	∢	\sphericalangle$^{\text{ord}}$
⍊		\rip$^{\text{ord}}$			

Delimiters as symbols (matha)

(	(	($^{\text{open}}$	)	)	)$^{\text{close}}$
[	[	[$^{\text{open}}$	]	]	]$^{\text{close}}$
\	\	\setminus$^{\text{ord}}$	/	/	/$^{\text{ord}}$
$\vert$	$\vert$	$\vert^{\text{ord}}$	$\vert$	$\vert$	\mid$^{\text{rel}}$

Delimiters as symbols (mathb)

⌜⌞		\lcorners$^{\text{open}}$	⌝⌟		\rcorners$^{\text{close}}$
⌜	⌜	\ulcorner$^{\text{open}}$	⌝	⌝	\urcorner$^{\text{close}}$
⌞	⌞	\llcorner$^{\text{open}}$	⌟	⌟	\lrcorner$^{\text{close}}$

Astronomical symbols (mathb)

☉		\Sun$^{\text{ord}}$	☿		\Mercury$^{\text{ord}}$
♀		\Venus$^{\text{ord}}$, \girl	⊕		\Earth$^{\text{ord}}$

♂	`\Mars`$^{\text{ord}}$, `\boy`	♃	`\Jupiter`$^{\text{ord}}$
♄	`\Saturn`$^{\text{ord}}$	♅	`\Uranus`$^{\text{ord}}$
♆	`\Neptune`$^{\text{ord}}$	♇	`\Pluto`$^{\text{ord}}$
♁	`\varEarth`$^{\text{ord}}$	☾	`\leftmoon`$^{\text{ord}}$, `\Moon`
☽	`\rightmoon`$^{\text{ord}}$	○	`\fullmoon`$^{\text{ord}}$
●	`\newmoon`$^{\text{ord}}$	♈	`\Aries`$^{\text{ord}}$
♉	`\Taurus`$^{\text{ord}}$	♊	`\Gemini`$^{\text{ord}}$
♌	`\Leo`$^{\text{ord}}$	♎	`\Libra`$^{\text{ord}}$
♏	`\Scorpio`$^{\text{ord}}$		

Letter like symbols (matha)

∀	∀	`\forall`$^{\text{ord}}$	∁	∁	`\complement`$^{\text{ord}}$
∂	∂	`\partial`$^{\text{ord}}$	∂̸		`\partialslash`$^{\text{ord}}$
∃	∃	`\exists`$^{\text{ord}}$	∄	∄	`\nexists`$^{\text{ord}}$
Ⅎ	Ⅎ	`\Finv`$^{\text{ord}}$	⅁	⅁	`\Game`$^{\text{ord}}$
∅	∅	`\emptyset`$^{\text{ord}}$	⌀		`\diameter`$^{\text{ord}}$
⊤	⊤	`\top`$^{\text{ord}}$	⊥	⊥	`\bot`$^{\text{ord}}$
⊥	⊥	`\perp`$^{\text{rel}}$	⊤̸		`\nottop`$^{\text{ord}}$
⊥̸		`\notbot`$^{\text{ord}}$	⊥̸		`\notperp`$^{\text{rel}}$
⋏	⋏	`\curlywedge`$^{\text{bin}}$	⋎	⋎	`\curlyvee`$^{\text{bin}}$
∈	∈	`\in`$^{\text{rel}}$	∋	∋	`\owns`$^{\text{rel}}$, `\ni`
∉	∉	`\notin`$^{\text{rel}}$	∌		`\notowner`$^{\text{rel}}$, `\notni`, `\notowns`
∉		`\varnotin`$^{\text{rel}}$	∌		`\varnotowner`$^{\text{rel}}$
⋹		`\barin`$^{\text{rel}}$	⋽		`\ownsbar`$^{\text{rel}}$, `\nibar`
∩	⋂	`\cap`$^{\text{bin}}$	∪	⋃	`\cup`$^{\text{bin}}$
⊎	⨄	`\uplus`$^{\text{bin}}$	⊓	⨅	`\sqcap`$^{\text{bin}}$
⊔	⨆	`\sqcup`$^{\text{bin}}$	⊞		`\squplus`$^{\text{bin}}$
∧	⋀	`\wedge`$^{\text{bin}}$, `\land`	∨	⋁	`\vee`$^{\text{bin}}$, `\lor`

Letter like symbols (mathb)

⊼	⊼	`\barwedge`$^{\text{bin}}$	⊻	⊻	`\veebar`$^{\text{bin}}$
⩞	⩞	`\doublebarwedge`$^{\text{bin}}$	⩢		`\veedoublebar`$^{\text{bin}}$
⋒	⋒	`\doublecap`$^{\text{bin}}$, `\Cap`	⋓	⋓	`\doublecup`$^{\text{bin}}$, `\Cup`
⩎		`\sqdoublecap`$^{\text{bin}}$, `\sqCap`	⩏		`\sqdoublecup`$^{\text{bin}}$, `\sqCup`

Subset's and superset's signs (matha)

⊂	⊂	`\subset`$^{\text{rel}}$	⊃	⊃	`\supset`$^{\text{rel}}$
⊄		`\nsubset`$^{\text{rel}}$	⊅		`\nsupset`$^{\text{rel}}$
⊆	⊆	`\subseteq`$^{\text{rel}}$	⊇	⊇	`\supseteq`$^{\text{rel}}$
⊈	⊈	`\nsubseteq`$^{\text{rel}}$	⊉	⊉	`\nsupseteq`$^{\text{rel}}$
⊊	⊊	`\subsetneq`$^{\text{rel}}$	⊋	⊋	`\supsetneq`$^{\text{rel}}$
⊊	⊊	`\varsubsetneq`$^{\text{rel}}$	⊋	⊋	`\varsupsetneq`$^{\text{rel}}$
⫅	⫅	`\subseteqq`$^{\text{rel}}$	⫆	⫆	`\supseteqq`$^{\text{rel}}$
⫅̸	⫅̸	`\nsubseteqq`$^{\text{rel}}$	⫆̸	⫆̸	`\nsupseteqq`$^{\text{rel}}$
⫋	⫋	`\subsetneqq`$^{\text{rel}}$	⫌	⫌	`\supsetneqq`$^{\text{rel}}$
⫋	⫋	`\varsubsetneqq`$^{\text{rel}}$	⫌	⫌	`\varsupsetneqq`$^{\text{rel}}$
⋐	⊂	`\Subset`$^{\text{rel}}$	⋑	⋑	`\Supset`$^{\text{rel}}$
⋐̸		`\nSubset`$^{\text{rel}}$	⋑̸		`\nSupset`$^{\text{rel}}$

Square subset's and superset's signs (mathb)

$\sqsubset$	$\sqsubset$	`\sqsubset`$^{\mathrm{rel}}$	$\sqsupset$	$\sqsupset$	`\sqsupset`$^{\mathrm{rel}}$
$\nsqsubset$		`\nsqsubset`$^{\mathrm{rel}}$	$\nsqsupset$		`\nsqsupset`$^{\mathrm{rel}}$
$\sqsubseteq$	$\sqsubseteq$	`\sqsubseteq`$^{\mathrm{rel}}$	$\sqsupseteq$	$\sqsupseteq$	`\sqsupseteq`$^{\mathrm{rel}}$
$\nsqsubseteq$		`\nsqsubseteq`$^{\mathrm{rel}}$	$\nsqsupseteq$		`\nsqsupseteq`$^{\mathrm{rel}}$
$\sqsubsetneq$		`\sqsubsetneq`$^{\mathrm{rel}}$	$\sqsupsetneq$		`\sqsupsetneq`$^{\mathrm{rel}}$
$\varsqsubsetneq$		`\varsqsubsetneq`$^{\mathrm{rel}}$	$\varsqsupsetneq$		`\varsqsupsetneq`$^{\mathrm{rel}}$
$\sqsubseteqq$		`\sqsubseteqq`$^{\mathrm{rel}}$	$\sqsupseteqq$		`\sqsupseteqq`$^{\mathrm{rel}}$
$\nsqsubseteqq$		`\nsqsubseteqq`$^{\mathrm{rel}}$	$\nsqsupseteqq$		`\nsqsupseteqq`$^{\mathrm{rel}}$
$\sqsubsetneqq$		`\sqsubsetneqq`$^{\mathrm{rel}}$	$\sqsupsetneqq$		`\sqsupsetneqq`$^{\mathrm{rel}}$
$\varsqsubsetneqq$		`\varsqsubsetneqq`$^{\mathrm{rel}}$	$\varsqsupsetneqq$		`\varsqsupsetneqq`$^{\mathrm{rel}}$
$\sqSubset$		`\sqSubset`$^{\mathrm{rel}}$	$\sqSupset$		`\sqSupset`$^{\mathrm{rel}}$
$\nsqSubset$		`\nsqSubset`$^{\mathrm{rel}}$	$\nsqSupset$		`\nsqSupset`$^{\mathrm{rel}}$

Triangles as relations (matha)

$\triangleleft$	$\triangleleft$	`\triangleleft`$^{\mathrm{bin}}$	$\vartriangleleft$	$\vartriangleleft$	`\vartriangleleft`$^{\mathrm{rel}}$
$\triangleright$	$\triangleright$	`\triangleright`$^{\mathrm{bin}}$	$\vartriangleright$	$\vartriangleright$	`\vartriangleright`$^{\mathrm{rel}}$
$\ntriangleleft$	$\ntriangleleft$	`\ntriangleleft`$^{\mathrm{rel}}$	$\ntriangleright$	$\ntriangleright$	`\ntriangleright`$^{\mathrm{rel}}$
$\trianglelefteq$	$\trianglelefteq$	`\trianglelefteq`$^{\mathrm{rel}}$	$\trianglerighteq$	$\trianglerighteq$	`\trianglerighteq`$^{\mathrm{rel}}$
$\ntrianglelefteq$	$\ntrianglelefteq$	`\ntrianglelefteq`$^{\mathrm{rel}}$	$\ntrianglerighteq$	$\ntrianglerighteq$	`\ntrianglerighteq`$^{\mathrm{rel}}$

Triangles as binary operators (mathb)

$\smalltriangleup$		`\smalltriangleup`$^{\mathrm{bin}}$	$\smalltriangledown$		`\smalltriangledown`$^{\mathrm{bin}}$
$\smalltriangleleft$		`\smalltriangleleft`$^{\mathrm{bin}}$	$\smalltriangleright$		`\smalltriangleright`$^{\mathrm{bin}}$
$\blacktriangleup$		`\blacktriangleup`$^{\mathrm{bin}}$	$\blacktriangledown$	$\blacktriangledown$	`\blacktriangledown`$^{\mathrm{bin}}$
$\blacktriangleleft$	$\blacktriangleleft$	`\blacktriangleleft`$^{\mathrm{bin}}$	$\blacktriangleright$	$\blacktriangleright$	`\blacktriangleright`$^{\mathrm{bin}}$

Inequalities (matha)

$<$	$<$	`<`$^{\mathrm{rel}}$	$>$	$>$	`>`$^{\mathrm{rel}}$
$\nless$	$\nless$	`\nless`$^{\mathrm{rel}}$	$\ngtr$	$\ngtr$	`\ngtr`$^{\mathrm{rel}}$
$\leq$	$\leq$	`\leq`$^{\mathrm{rel}}$, `\le`, `\leqslant`	$\geq$	$\geq$	`\geq`$^{\mathrm{rel}}$, `\ge`, `\geqslant`
$\nleq$	$\nleq$	`\nleq`$^{\mathrm{rel}}$, `\nleqslant`	$\ngeq$	$\ngeq$	`\ngeq`$^{\mathrm{rel}}$, `\ngeqslant`
$\varleq$		`\varleq`$^{\mathrm{rel}}$	$\vargeq$		`\vargeq`$^{\mathrm{rel}}$
$\nvarleq$		`\nvarleq`$^{\mathrm{rel}}$	$\nvargeq$		`\nvargeq`$^{\mathrm{rel}}$
$\lneq$	$\lneq$	`\lneq`$^{\mathrm{rel}}$	$\gneq$	$\gneq$	`\gneq`$^{\mathrm{rel}}$
$\leqq$	$\leqq$	`\leqq`$^{\mathrm{rel}}$	$\geqq$	$\geqq$	`\geqq`$^{\mathrm{rel}}$
$\nleqq$	$\nleqq$	`\nleqq`$^{\mathrm{rel}}$	$\ngeqq$	$\ngeqq$	`\ngeqq`$^{\mathrm{rel}}$
$\lneqq$	$\lneqq$	`\lneqq`$^{\mathrm{rel}}$	$\gneqq$	$\gneqq$	`\gneqq`$^{\mathrm{rel}}$
$\lvertneqq$	$\lvertneqq$	`\lvertneqq`$^{\mathrm{rel}}$	$\gvertneqq$	$\gvertneqq$	`\gvertneqq`$^{\mathrm{rel}}$
$\eqslantless$	$\eqslantless$	`\eqslantless`$^{\mathrm{rel}}$	$\eqslantgtr$	$\eqslantgtr$	`\eqslantgtr`$^{\mathrm{rel}}$
$\neqslantless$		`\neqslantless`$^{\mathrm{rel}}$	$\neqslantgtr$		`\neqslantgtr`$^{\mathrm{rel}}$
$\lessgtr$	$\lessgtr$	`\lessgtr`$^{\mathrm{rel}}$	$\gtrless$	$\gtrless$	`\gtrless`$^{\mathrm{rel}}$
$\lesseqgtr$	$\lesseqgtr$	`\lesseqgtr`$^{\mathrm{rel}}$	$\gtreqless$	$\gtreqless$	`\gtreqless`$^{\mathrm{rel}}$
$\lesseqqgtr$	$\lesseqqgtr$	`\lesseqqgtr`$^{\mathrm{rel}}$	$\gtreqqless$	$\gtreqqless$	`\gtreqqless`$^{\mathrm{rel}}$
$\lesssim$	$\lesssim$	`\lesssim`$^{\mathrm{rel}}$	$\gtrsim$	$\gtrsim$	`\gtrsim`$^{\mathrm{rel}}$
$\nlesssim$		`\nlesssim`$^{\mathrm{rel}}$	$\ngtrsim$		`\ngtrsim`$^{\mathrm{rel}}$
$\lnsim$	$\lnsim$	`\lnsim`$^{\mathrm{rel}}$	$\gnsim$	$\gnsim$	`\gnsim`$^{\mathrm{rel}}$
$\lessapprox$	$\lessapprox$	`\lessapprox`$^{\mathrm{rel}}$	$\gtrapprox$	$\gtrapprox$	`\gtrapprox`$^{\mathrm{rel}}$

$\nlessapprox$		\nlessapprox$^{\text{rel}}$	$\ngtrapprox$		\ngtrapprox$^{\text{rel}}$
$\lnapprox$	$\lnapprox$	\lnapprox$^{\text{rel}}$	$\gnapprox$	$\gnapprox$	\gnapprox$^{\text{rel}}$
$\lessdot$	$\lessdot$	\lessdot$^{\text{rel}}$	$\gtrdot$	$\gtrdot$	\gtrdot$^{\text{rel}}$
$\lll$	$\lll$	\lll$^{\text{rel}}$	$\ggg$	$\ggg$	\ggg$^{\text{rel}}$
$\precdot$		\precdot$^{\text{rel}}$	$\succdot$		\succdot$^{\text{rel}}$

Inequalities (mathb)

$\prec$	$\prec$	\prec$^{\text{rel}}$	$\succ$	$\succ$	\succ$^{\text{rel}}$
$\nprec$	$\nprec$	\nprec$^{\text{rel}}$	$\nsucc$	$\nsucc$	\nsucc$^{\text{rel}}$
$\preccurlyeq$	$\preccurlyeq$	\preccurlyeq$^{\text{rel}}$	$\succcurlyeq$	$\succcurlyeq$	\succcurlyeq$^{\text{rel}}$
$\npreccurlyeq$		\npreccurlyeq$^{\text{rel}}$	$\nsucccurlyeq$		\nsucccurlyeq$^{\text{rel}}$
$\preceq$	$\preceq$	\preceq$^{\text{rel}}$	$\succeq$	$\succeq$	\succeq$^{\text{rel}}$
$\npreceq$	$\npreceq$	\npreceq$^{\text{rel}}$	$\nsucceq$	$\nsucceq$	\nsucceq$^{\text{rel}}$
$\precneq$		\precneq$^{\text{rel}}$	$\succneq$		\succneq$^{\text{rel}}$
$\curlyeqprec$	$\curlyeqprec$	\curlyeqprec$^{\text{rel}}$	$\curlyeqsucc$	$\curlyeqsucc$	\curlyeqsucc$^{\text{rel}}$
$\ncurlyeqprec$		\ncurlyeqprec$^{\text{rel}}$	$\ncurlyeqsucc$		\ncurlyeqsucc$^{\text{rel}}$
$\precsim$	$\precsim$	\precsim$^{\text{rel}}$	$\succsim$	$\succsim$	\succsim$^{\text{rel}}$
$\nprecsim$		\nprecsim$^{\text{rel}}$	$\nsuccsim$		\nsuccsim$^{\text{rel}}$
$\precnsim$	$\precnsim$	\precnsim$^{\text{rel}}$	$\succnsim$	$\succnsim$	\succnsim$^{\text{rel}}$
$\precapprox$	$\precapprox$	\precapprox$^{\text{rel}}$	$\succapprox$	$\succapprox$	\succapprox$^{\text{rel}}$
$\nprecapprox$		\nprecapprox$^{\text{rel}}$	$\nsuccapprox$		\nsuccapprox$^{\text{rel}}$
$\precnapprox$	$\precnapprox$	\precnapprox$^{\text{rel}}$	$\succnapprox$	$\succnapprox$	\succnapprox$^{\text{rel}}$
$\llcurly$		\llcurly$^{\text{rel}}$	$\ggcurly$		\ggcurly$^{\text{rel}}$

Arrows and harppons (matha)

$\leftarrow$	$\leftarrow$	\leftarrow$^{\text{rel}}$, \gets	$\rightarrow$	$\rightarrow$	\rightarrow$^{\text{rel}}$, \to
$\nwarrow$	$\nwarrow$	\nwarrow$^{\text{rel}}$	$\nearrow$	$\nearrow$	\nearrow$^{\text{rel}}$
$\swarrow$	$\swarrow$	\swarrow$^{\text{rel}}$	$\searrow$	$\searrow$	\searrow$^{\text{rel}}$
$\leftrightarrow$	$\leftrightarrow$	\leftrightarrow$^{\text{rel}}$	$\nleftarrow$	$\nleftarrow$	\nleftarrow$^{\text{rel}}$
$\nrightarrow$	$\nrightarrow$	\nrightarrow$^{\text{rel}}$	$\nleftrightarrow$	$\nleftrightarrow$	\nleftrightarrow$^{\text{rel}}$
$\relbar$	$\relbar$	\relbar$^{\text{rel}}$	$\mapstochar$	$\mapstochar$	\mapstochar$^{\text{rel}}$
$\mapsfromchar$		\mapsfromchar$^{\text{rel}}$	$\leftharpoonup$	$\leftharpoonup$	\leftharpoonup$^{\text{rel}}$
$\rightharpoonup$	$\rightharpoonup$	\rightharpoonup$^{\text{rel}}$	$\leftharpoondown$	$\leftharpoondown$	\leftharpoondown$^{\text{rel}}$
$\rightharpoondown$	$\rightharpoondown$	\rightharpoondown$^{\text{rel}}$	$\upharpoonleft$	$\upharpoonleft$	\upharpoonleft$^{\text{rel}}$
$\downharpoonleft$	$\downharpoonleft$	\downharpoonleft$^{\text{rel}}$	$\upharpoonright$	$\upharpoonright$	\upharpoonright$^{\text{rel}}$
$\restriction$	$\restriction$	\restriction$^{\text{ord}}$	$\downharpoonright$	$\downharpoonright$	\downharpoonright$^{\text{rel}}$
$\leftrightharpoons$	$\leftrightharpoons$	\leftrightharpoons$^{\text{rel}}$	$\rightleftharpoons$	$\rightleftharpoons$	\rightleftharpoons$^{\text{rel}}$
$\updownharpoons$		\updownharpoons$^{\text{rel}}$	$\downupharpoons$		\downupharpoons$^{\text{rel}}$
$\Leftarrow$	$\Leftarrow$	\Leftarrow$^{\text{rel}}$	$\Rightarrow$	$\Rightarrow$	\Rightarrow$^{\text{rel}}$
$\Leftrightarrow$	$\Leftrightarrow$	\Leftrightarrow$^{\text{rel}}$	$\nLeftarrow$	$\nLeftarrow$	\nLeftarrow$^{\text{rel}}$
$\nRightarrow$	$\nRightarrow$	\nRightarrow$^{\text{rel}}$	$\nLeftrightarrow$	$\nLeftrightarrow$	\nLeftrightarrow$^{\text{rel}}$
$\Relbar$	$\Relbar$	\Relbar$^{\text{rel}}$	$\Mapstochar$		\Mapstochar$^{\text{rel}}$
$\Mapsfromchar$		\Mapsfromchar$^{\text{rel}}$			

Arrows and harpoons (mathb)

$\leftleftarrows$	$\leftleftarrows$	\leftleftarrows$^{\text{rel}}$	$\rightrightarrows$	$\rightrightarrows$	\rightrightarrows$^{\text{rel}}$
$\upuparrows$	$\upuparrows$	\upuparrows$^{\text{rel}}$	$\downdownarrows$	$\downdownarrows$	\downdownarrows$^{\text{rel}}$
$\leftrightarrows$	$\leftrightarrows$	\leftrightarrows$^{\text{rel}}$	$\rightleftarrows$	$\rightleftarrows$	\rightleftarrows$^{\text{rel}}$
$\updownarrows$		\updownarrows$^{\text{rel}}$	$\downuparrows$		\downuparrows$^{\text{rel}}$

$\leftleftharpoons$	\leftleftharpoons$^{\text{rel}}$	$\rightrightharpoons$	\rightrightharpoons$^{\text{rel}}$
$\upupharpoons$	\upupharpoons$^{\text{rel}}$	$\downdownharpoons$	\downdownharpoons$^{\text{rel}}$
$\leftbarharpoon$	\leftbarharpoon$^{\text{rel}}$	$\rightbarharpoon$	\rightbarharpoon$^{\text{rel}}$
$\barleftharpoon$	\barleftharpoon$^{\text{rel}}$	$\barrightharpoon$	\barrightharpoon$^{\text{rel}}$
$\leftrightharpoon$	\leftrightharpoon$^{\text{rel}}$	$\rightleftharpoon$	\rightleftharpoon$^{\text{rel}}$
$\rhook$ $\rhook$	\rhook$^{\text{rel}}$	$\lhook$ $\lhook$	\lhook$^{\text{rel}}$
$\diagup$ $\diagup$	\diagup$^{\text{rel}}$	$\diagdown$ $\diagdown$	\diagdown$^{\text{rel}}$
$\Lsh$ $\ulsh$	\Lsh$^{\text{rel}}$, \ulsh	$\Rsh$ $\ursh$	\Rsh$^{\text{rel}}$, \ursh
$\dlsh$	\dlsh$^{\text{rel}}$	$\drsh$	\drsh$^{\text{rel}}$
$\looparrowleft$ $\looparrowupleft$	\looparrowleft$^{\text{rel}}$, \looparrowupleft		
$\looparrowright$ $\looparrowupright$	\looparrowright$^{\text{rel}}$, \looparrowupright		
$\looparrowdownleft$	\looparrowdownleft$^{\text{rel}}$	$\looparrowdownright$	\looparrowdownright$^{\text{rel}}$
$\curvearrowleft$ $\curvearrowtopleft$	\curvearrowleft$^{\text{rel}}$, \curvearrowtopleft		
$\curvearrowright$ $\curvearrowtopright$	\curvearrowright$^{\text{rel}}$, \curvearrowtopright		
$\curvearrowleftright$	\curvearrowleftright$^{\text{rel}}$, \curvearrowtopleftright		
$\curvearrowbotleft$	\curvearrowbotleft$^{\text{rel}}$	$\curvearrowbotright$	\curvearrowbotright$^{\text{rel}}$
$\curvearrowbotleftright$	\curvearrowbotleftright$^{\text{rel}}$	$\circlearrowleft$ $\circlearrowleft$	\circlearrowleft$^{\text{rel}}$
$\circlearrowright$ $\circlearrowright$	\circlearrowright$^{\text{rel}}$	$\leftsquigarrow$	\leftsquigarrow$^{\text{rel}}$
$\rightsquigarrow$ $\rightsquigarrow$	\rightsquigarrow$^{\text{rel}}$	$\leftrightsquigarrow$	\leftrightsquigarrow$^{\text{rel}}$
$\lefttorightarrow$	\lefttorightarrow$^{\text{rel}}$	$\righttoleftarrow$	\righttoleftarrow$^{\text{rel}}$
$\uptodownarrow$	\uptodownarrow$^{\text{rel}}$	$\downtouparrow$	\downtouparrow$^{\text{rel}}$

Circles (matha)

$\oplus$ $\oplus$	\oplus$^{\text{bin}}$	$\ominus$ $\ominus$	\ominus$^{\text{bin}}$, \circleddash
$\otimes$ $\otimes$	\otimes$^{\text{bin}}$	$\odiv$	\odiv$^{\text{bin}}$
$\odot$ $\odot$	\odot$^{\text{bin}}$	$\ocirc$	\ocirc$^{\text{bin}}$, \circledcirc
$\oasterisk$	\oasterisk$^{\text{bin}}$, \circledast	$\ocoasterisk$	\ocoasterisk$^{\text{bin}}$
$\oleft$	\oleft$^{\text{bin}}$	$\oright$	\oright$^{\text{bin}}$
$\otop$	\otop$^{\text{bin}}$	$\obot$	\obot$^{\text{bin}}$, \operp
$\ovoid$	\ovoid$^{\text{bin}}$	$\oslash$ $\oslash$	\oslash$^{\text{bin}}$
$\obackslash$	\obackslash$^{\text{bin}}$	$\otriangleup$	\otriangleup$^{\text{bin}}$

Boxes (mathb)

$\boxplus$ $\boxplus$	\boxplus$^{\text{bin}}$	$\boxminus$ $\boxminus$	\boxminus$^{\text{bin}}$, \boxeddash
$\boxtimes$ $\boxtimes$	\boxtimes$^{\text{bin}}$	$\boxdiv$	\boxdiv$^{\text{bin}}$
$\boxdot$ $\boxdot$	\boxdot$^{\text{bin}}$	$\boxcirc$	\boxcirc$^{\text{bin}}$, \boxedcirc
$\boxasterisk$	\boxasterisk$^{\text{bin}}$, \boxedast	$\boxcoasterisk$	\boxcoasterisk$^{\text{bin}}$
$\boxleft$	\boxleft$^{\text{bin}}$	$\boxright$	\boxright$^{\text{bin}}$
$\boxtop$	\boxtop$^{\text{bin}}$	$\boxbot$	\boxbot$^{\text{bin}}$, \boxperp
$\boxvoid$	\boxvoid$^{\text{bin}}$	$\Box$	\Box$^{\text{ord}}$
$\boxslash$	\boxslash$^{\text{bin}}$	$\boxbackslash$	\boxbackslash$^{\text{bin}}$
$\boxtriangleup$	\boxtriangleup$^{\text{bin}}$		

Mayan numerals

Large operators (mathx)

$\sum$ $\sum$	\sum$^{\text{op}}$	$\prod$ $\prod$	\prod$^{\text{op}}$
$\coprod$ $\coprod$	\coprod$^{\text{op}}$	$\intop$ $\intop$	\intop$^{\text{op}}$

$\iint$		`\iintop`$^{\text{op}}$, `\iint`	$\iiint$		`\iiintop`$^{\text{op}}$, `\iiint`
$\oint$	$\oint$	`\ointop`$^{\text{op}}$, `\oint`	$\oiint$		`\oiintop`$^{\text{op}}$, `\oiint`
$+$		`\bigplus`$^{\text{op}}$	$\times$		`\bigtimes`$^{\text{op}}$
$\complement$		`\bigcomplementop`$^{\text{op}}$	$\bigcap$	$\bigcap$	`\bigcap`$^{\text{op}}$
$\bigcup$	$\bigcup$	`\bigcup`$^{\text{op}}$	$\biguplus$	$\biguplus$	`\biguplus`$^{\text{op}}$
$\sqcap$		`\bigsqcap`$^{\text{op}}$	$\bigsqcup$	$\bigsqcup$	`\bigsqcup`$^{\text{op}}$
$\boxplus$		`\bigsquplus`$^{\text{op}}$	$\bigwedge$	$\bigwedge$	`\bigwedge`$^{\text{op}}$
$\bigvee$	$\bigvee$	`\bigvee`$^{\text{op}}$	$\curlywedge$		`\bigcurlywedge`$^{\text{op}}$
$\curlyvee$		`\bigcurlyvee`$^{\text{op}}$			

Big circles (mathx)

$\bigoplus$	$\bigoplus$	`\bigoplus`$^{\text{op}}$	$\ominus$		`\bigominus`$^{\text{op}}$
$\bigotimes$	$\bigotimes$	`\bigotimes`$^{\text{op}}$	$\oslash$		`\bigodiv`$^{\text{op}}$
$\bigodot$	$\bigodot$	`\bigodot`$^{\text{op}}$	$\circledcirc$		`\bigocirc`$^{\text{op}}$
$\circledast$		`\bigoasterisk`$^{\text{op}}$	$\circledast$		`\bigocoasterisk`$^{\text{op}}$
		`\bigoleft`$^{\text{op}}$			`\bigoright`$^{\text{op}}$
		`\bigotop`$^{\text{op}}$			`\bigobot`$^{\text{op}}$, `\bigoperp`
$\bigcirc$		`\bigovoid`$^{\text{op}}$	$\oslash$		`\bigoslash`$^{\text{op}}$
$\obslash$		`\bigobackslash`$^{\text{op}}$			`\bigotriangleup`$^{\text{op}}$

Big boxes (mathx)

$\boxplus$		`\bigboxplus`$^{\text{op}}$	$\boxminus$		`\bigboxminus`$^{\text{op}}$
$\boxtimes$		`\bigboxtimes`$^{\text{op}}$			`\bigboxdiv`$^{\text{op}}$
$\boxdot$		`\bigboxdot`$^{\text{op}}$			`\bigboxcirc`$^{\text{op}}$
$\boxast$		`\bigboxasterisk`$^{\text{op}}$			`\bigboxcoasterisk`$^{\text{op}}$
		`\bigboxleft`$^{\text{op}}$			`\bigboxright`$^{\text{op}}$
		`\bigboxtop`$^{\text{op}}$			`\bigboxbot`$^{\text{op}}$, `\bigboxperp`
$\square$		`\bigboxvoid`$^{\text{op}}$	$\boxslash$		`\bigboxslash`$^{\text{op}}$
$\boxbslash$		`\bigboxbackslash`$^{\text{op}}$			`\bigboxtriangleup`$^{\text{op}}$

Delimiters (matha/mathx)

$($	$($	`(`$^{\text{other}}$	$)$	$)$	`)`$^{\text{other}}$
$[$	$[$	`[`$^{\text{other}}$	$]$	$]$	`]`$^{\text{other}}$
$\{$	$\{$	`\lbrace`$^{\text{open}}$, `\{`	$\}$	$\}$	`\rbrace`$^{\text{close}}$, `\}`
$[\![$		`\ldbrack`$^{\text{open}}$, `\lsemantic`	$]\!]$		`\rdbrack`$^{\text{close}}$, `\rsemantic`
$\langle$	$\langle$	`\langle`$^{\text{open}}$	$\rangle$	$\rangle$	`\rangle`$^{\text{close}}$
$\backslash$	$\backslash$	`\backslash`$^{\text{ord}}$	$/$	$/$	`/`$^{\text{other}}$
$\vert$	$\vert$	`\vert`$^{\text{ord}}$	$\vert$	$\vert$	`|`$^{\text{other}}$
$\Vert$	$\Vert$	`\Vert`$^{\text{ord}}$	$\vert\vert\vert$		`\vvvert`$^{\text{ord}}$, `|`
$\uparrow$	$\uparrow$	`\uparrow`$^{\text{rel}}$	$\downarrow$	$\downarrow$	`\downarrow`$^{\text{rel}}$
$\updownarrow$	$\updownarrow$	`\updownarrow`$^{\text{rel}}$	$\Uparrow$	$\Uparrow$	`\Uparrow`$^{\text{rel}}$
$\Downarrow$	$\Downarrow$	`\Downarrow`$^{\text{rel}}$	$\Updownarrow$	$\Updownarrow$	`\Updownarrow`$^{\text{rel}}$

Delimiters (mathb/mathx)

$\lgroup$	$\lgroup$	`\lgroup`$^{\text{open}}$	$\rgroup$	$\rgroup$	`\rgroup`$^{\text{close}}$
$\lceil$	$\lceil$	`\lceil`$^{\text{open}}$	$\rceil$	$\rceil$	`\rceil`$^{\text{close}}$
$\lfloor$	$\lfloor$	`\lfloor`$^{\text{open}}$	$\rfloor$	$\rfloor$	`\rfloor`$^{\text{close}}$
$\vert$		`\thickvert`$^{\text{ord}}$			

Delimiters (mathx/mathx)

$\lfilet$	`\lfilet`$^{\text{open}}$	$\rfilet$	`\rfilet`$^{\text{close}}$

Pieces for over-under-braces and such (mathx)

$\braceld$	`\braceld`$^{\text{ord}}$	$\bracemd$	`\bracemd`$^{\text{ord}}$
$\bracerd$	`\bracerd`$^{\text{ord}}$	$\bracexd$	`\bracexd`$^{\text{ord}}$
$\bracelu$	`\bracelu`$^{\text{ord}}$	$\bracemu$	`\bracemu`$^{\text{ord}}$
$\braceru$	`\braceru`$^{\text{ord}}$	$\bracexu$	`\bracexu`$^{\text{ord}}$

Extensible accents (mathx)

$\widehat{}$	`\widehat`$^{\text{other}}$	$\widecheck{}$	`\widecheck`$^{\text{other}}$
$\widetilde{}$	`\widetilde`$^{\text{other}}$	$\widebar{}$	`\widebar`$^{\text{other}}$
$\widearrow{}$	`\widearrow`$^{\text{other}}$	$\wideparen{}$	`\wideparen`$^{\text{other}}$
$\sqrt{}$	`\sqrt`$^{\text{other}}$		

2. Special constructions

The special constructions described here are defined in the file `mathabx.dcl`. Usual plainTEX/LATEX constructions should be supported if not replaced by some *mathabx* symbol.

- The control sequences `\not`, `\varnot`, `\changenotsign` are described in some next section.
- The control sequences `\overbrace`, etc., have been defined as suggested by Matthias Clasen and Ulrik Vieth in *newmath*.

$\overbrace{abcde}$	`\overbrace`	$\underbrace{abcde}$	`\underbrace`
$\overgroup{abcde}$	`\overgroup`	$\undergroup{abcde}$	`\undergroup`

- The control sequences `\overrightarrow`, etc., have been defined anew (*see* `mathabx.dcl`). They will certainly be improved since they work only in textstyle and displaystyle modes (as for standard plainTEX/LATEX).

$$\overrightarrow{\overrightarrow{abcde}abcde}abcde$$

$\overrightarrow{abcde}$	`\overrightarrow`	$\overleftarrow{abcde}$	`\overleftarrow`
$\overleftrightarrow{abcde}$	`\overleftrightarrow`	$\underrightarrow{abcde}$	`\underrightarrow`
$\underleftarrow{abcde}$	`\underleftarrow`	$\underleftrightarrow{abcde}$	`\underleftrightarrow`
$\overRightarrow{abcde}$	`\overRightarrow`	$\overLeftarrow{abcde}$	`\overLeftarrow`
$\overLeftRightarrow{abcde}$	`\overLeftRightarrow`	$\underRightarrow{abcde}$	`\underRightarrow`
$\underLeftarrow{abcde}$	`\underLeftarrow`	$\underLeftRightarrow{abcde}$	`\underLeftRightarrow`

- The build-in accent `\wideparen` allows to build other accent-like control sequences.

$\widering{abcde}$	`\widering`	$\widedot{abcde}$	`\widedot`
$\wideddot{abcde}$	`\wideddot`	$\widedddot{abcde}$	`\widedddot`
$\wideddddot{abcde}$	`\wideddddot`		

- At last, some symbols like `\int`, `\bigcomplement`, `\surd`, must be defined by some `\def` because of limits or such.

But it seems clear when viewing what is done elsewhere that the already too large mathabx set should (really?) be extended. This may be done by combining already existing symbols. If not, I would once again take my pen, some paper and my keyboard if necessary.

3. Global installation

In the *mathabx.me* distribution, MetaFont source files (`xxx.mf`) are all located in the `source/` directory. They may be moved to a (new) subdirectory named `mathabx` of `$TEXMF/fonts/source/public/`, thus in

`$TEXMF/fonts/source/public/mathabx/`

where `$TEXMF` stands for the root directory of the TEXMF distribution of the computer. PlainTEX/LATEXinput files are all located in the `texinputs` directory of this distribution. The three files `mathabx.tex`, `mathabx.sty` and `mathabx.dcl` may be moved to the directory

`$TEXMF/tex/generic/misc/`

(other location may be also fine). Other TEX files are there for documentation. They can be removed.

At last, the TEXMF system needs to know that new files have been added. This can be done by executing from a console `texhash` or such, some command that refreshes the TEXMF database. We don't provide more informations on this last subject since it may depend on every particular TEXMF distribution and computer system.

If a previous *mathabx* distribution has been already installed, please remove every bitmap fonts (`xxx.yyypk`) and metrics (`xxx.tfm`) related to *mathabx* (only!) since all of them may change from a ditribution to another.

We won't write anything about local installation (on Unices systems for instance), nor about Type 1 conversions and installation of the *mathabx* fonts. One can find informations about these two last topics on the World Wide Web (but maybe in japanese).

4. Use with plainTEX

The basic input file is `mathabx.tex`. It requires `mathabx.dcl` which is common to plainTEX and LATEX. So one should type

`\input mathabx.tex`

at the beginning of his (her) plainTEX document. This sets up all the symbols previously described and defines 3 new families of mathematical symbols whose numbers are `\mathafam`, `\mathbfam` and `\mathxfam`. Pointsizes are 10 pt, *i.e.*, textstyle is 10 pt, scriptstyle is 7 pt and scriptscriptstyle is 5 pt for `\mathafam` and `\mathbfam` families. For `\mathxfam` the three styles correspond to a pointsize equal to 10 pt as for `cmex` in plainTEX. Changing pointsizes is easy since any plainTEXuser know how to do so (one can also look into `mathabx.tex` to make sure). Remember that setting the control sequence `\proofmode` to a known value before inputing `mathabx.tex` would lead to the verbose mode as illustrated in Section 1 of this document.

5. Use with LATEX

The basic package is `mathabx.sty`. It requires `mathabx.dcl` which is common to plainTEX and LATEX. So one should type

`\usepackage{mathabx}`

in the preamble of his (her) LATEX document. This sets up all the symbols previously described and defines 3 new families of mathematical symbols whose LATEX names are `matha`, `mathb` and `mathx` (according to LATEX font selection scheme). These families behave as expected with pointsize changes. The possible options of the `mathabx` package are `matha`, `mathb` and `mathx`. They allow to select which families would be actually defines. For instance

`\usepackage[matha,mathx]{mathabx}`

ignores the *mathb* family and load only *matha* and *mathx* families. Remember that no option means that the three families would be loaded. No individual symbol selection has been setted. If one wants to use only, say, a couple of symbols in the *mathabx* series, he (she) would have to it by him(her)self.

6. The control sequence `\not`

With plainTEX or LATEX, the control sequence `\not` only invocates a particular mathematical character (slanted line) which is of relation-type. This character, which width is zero, ...

Ce caractère, qui est de longueur nulle, recouvre le caractère suivant d'autant mieux que son mode d'espacement est du type relation et que sa largeur a une certaine valeur (celle des signes + ou =). Autrement, le recouvrement peut être assez mauvais (en fait, inadapté).

Dans les séries présentées ici, certaines négations ont été définies. Il semblait alors souhaitable que la commande `\not` suivie par l'appel d'un caractère possédant sa négation propre ait pour résultat cette dernière. Il suffisait pour cela de définir `\not` comme une commande à un argument qui teste si cet argument est une commande dont la négation est définie (si celle-ci est `\xxx`, le test porte sur l'existence de `\notxxx` ou de `\nxxx`), auquel cas ce sera elle qui sera appliquée, sinon (si l'argument n'est pas une commande, par exemple si c'est un caractère, ou si la négation n'est pas définie) la méthode de superposition sera utilisée.

Le caractère de négation est appelé par `\notsign`, il appartient à la série *matha* et est droit. On peut y préférer une ligne inclinée présente dans la série *mathb* et nommée `\varnotsign`. Il suffit alors d'échanger les noms. C'est ce que fait la commande `\changenotsign` et ce de manière éventuellement locale. Ainsi on aura :

$$A \varnot= B \qquad \texttt{\textbackslash changenotsign} \qquad A \neq B$$

bien qu'on doive préférer sur cet exemple l'emploi de la commande `\neq` : $A \neq B$. Ci-dessous nous avons recours à la commande `\not` (sauf pour `\neq`) pour des relations dont la négation est définie :

$$a = b \neq c \equiv d \not\equiv e \sim f \not\sim g \approx h \not\approx i \simeq j \not\simeq k \cong l \not\cong m,$$

puis pour des relations (entre autres) dont la négation n'est pas définie :

$$a \doteq b \not\doteq c \underset{\cdot}{=} d \not\underset{\cdot}{=} e \div f \not\div g \risingdotseq h \varnot\risingdotseq i \fallingdotseq j \varnot\fallingdotseq k S l \not S m,$$

où on se sera servi de `\changenotsign` à certains endroits. Il est à remarquer que l'espacement est perturbé de manière cohérente, c'est-à-dire de la même façon qu'il l'aurait été par le `\not` classique.

Nous avons aussi défini la commande `\varnot` de fonctionnement semblable à celui de l'instruction `\not` : `\varnot\xxx` teste si `\varnotxxx` est défini et, si oui exécute cette dernière, sinon applique `\varnotsign\xxx`. Nous reprenons la formule précédente avec cette commande :

$$a \doteq b \not\doteq c \underset{\cdot}{=} d \not\underset{\cdot}{=} e \div f \not\div g \risingdotseq h \varnot\risingdotseq i \fallingdotseq j \varnot\fallingdotseq k S l \not S m,$$

où on ne voit aucune différence. En revanche,

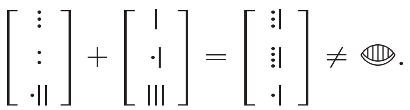
$$a = b \neq c \equiv d \not\equiv e \sim f \not\sim g \approx h \not\approx i \simeq j \not\simeq k \cong l \not\cong m$$

emploie dans ce cas uniquement la méthode de juxtaposition.

7. Mayan numerals

The presence of Mayan numerals in these series is related only to the history of the development of them. At the beginning, we wanted to keep some...

La présence de chiffres mayas dans ces séries n'est liée qu'à l'histoire du développement de celles-ci. Nous désirions au départ conserver quelques ressemblances avec les séries destinées au texte (caractères alphabétiques et numéraux). L'absence ou la rareté de possibilité de composer selon des numérations anciennes nous aura poussé à nous y intéresser un peu. Le résultat est illustré ci-dessous :



This line has been typesetted with

```
\mayadelimiters([,])
\maya{1251}+\maya{2135}=\maya{3386}\neq\mayadigit{0}.
```

Keeping these characters and the corresponding control sequences is always an open question.

8. La commande `\prime` et ses amies

Nous avons réintroduit les signes `\prime` multiples associés aux commandes `\prime`, `\second`, `\third` et `\fourth`. Une commande naturellement associée est `\degree` correspondant à un symbole semblable à celui appelé par `\circ`. Il est néanmoins différent car il doit être homogène à l'ensemble des symboles précédents (comparer 44° et 44°).

$$44^\circ + 36' + 89'' + 46''' + 99''''$$

La construction habituelle (*i.e.* `99''''`) supporte une propriété de ligaturage sur les caractères correspondants. C'est ce que l'on voit ci-dessous :

$$44^\circ + 36' + 89'' + 46''' + 99'''', \qquad \text{mais} \quad 99''''' \quad \text{ou} \quad 99''''''''.$$

(Il faut y regarder de très près pour y voir ce qu'il faut voir...)

9. Various trials

We begin by some meaningless expressions:

$$G \lhd H \trianglelefteq A \trianglerighteq B \rhd C$$
$$|G| \ntriangleleft |H| \ntrianglelefteq |A| \ntrianglerighteq |B| \ntriangleright |C|.$$

Then we look at variations with mathematical style:

$$\infty^{\infty^{\infty}} \qquad \infty^{\infty^{\infty}} \qquad \in^{\in^{\in}} \qquad \subset^{\subset^{\subset}} \qquad \subseteq^{\subseteq^{\subseteq}} \qquad <^{<^{<}} \qquad \sqrt{x}^{\sqrt{x}^{\sqrt{x}}}$$

The first `\infty` symbol is from *matha*, the next one is the *Computer Modern* one.

Other trials with sometimes *Computer Modern* symbols for comparison:

$$\Gamma\,\Sigma\,\Sigma\,\Pi\,\Pi\,\amalg\,D, \qquad f : X \circlearrowleft$$
$$\frac{\partial f}{\partial x}(x) \simeq \frac{\partial f}{\partial x}(x) \qquad \flat\flat\natural\natural\sharp\sharp\text{bof bof}$$
$$\|T(h)f - f\| = \|T(h)f - f\|$$
$$A \cap B \cup C \uplus D \vee E \wedge F$$
$$A \sqcap B \sqcup C \uplus D \veebar E \barwedge F \veebar G \doublebarwedge F \curlyvee H \curlywedge I$$
$$\dagger\,\dagger\,\ddagger\,\ddagger \qquad A^{\dagger^{\dagger}} \cdot A^{\dagger^{\dagger}} \qquad A \ast A \ast \{y\} \star [x] * (z) \qquad \surd\surd$$
$$\forall x \in y^{\perp},\ \exists S \subseteq R,\ \exists x,\ (\exists x), \quad z \cap y,\ x \in y$$
$$f \mapsto g \longmapsto h, \qquad f \hookrightarrow g \hookleftarrow h, \qquad A \Longmapsto B \Longleftarrow C, \qquad a \leftsquigarrow b \leftrightsquigarrow c \rightsquigarrow d.$$

Integrals in displaystyle then in textstyle (I don't want to forget that these signs are derived from the letter "S" even if I draw them my way):

$$\int\int\int_0^t f \circ g(x)\,\mathrm{d}x = \int\iint_0^t f \circ g(x)\,\mathrm{d}x = \iiint_0^t f \circ g(x)\,\mathrm{d}x$$
$$\int_0^t \oint_C f \circ g(x)\,\mathrm{d}x = \int_0^t \oint_C f \circ g(x)\,\mathrm{d}x = \oiint_S f \circ g(x)\,\mathrm{d}x$$
$$\textstyle\int\int\int_0^t f \circ g(x)\,\mathrm{d}x = \int\iint_0^t f \circ g(x)\,\mathrm{d}x = \iiint_0^t f \circ g(x)\,\mathrm{d}x$$
$$\textstyle\int_0^t \oint_C f \circ g(x)\,\mathrm{d}x = \int_0^t \oint_C f \circ g(x)\,\mathrm{d}x = \oiint_S f \circ g(x)\,\mathrm{d}x$$

Sums and products, etc., in displaystyle:

$$\prod_{i=0}^{i=n}\prod_{j=0}^{j=n}\prod_{k=0}^{k=n}\Gamma_k^{ij} = \prod_{i=0}^{i=n}\coprod_{j=0}^{j=n}\prod_{k=0}^{k=n}\Gamma_k^{ij} = \coprod_{i=0}^{i=n}\coprod_{j=0}^{j=n}\coprod_{k=0}^{k=n}\Gamma_k^{ij} = \prod_{i=0}^{i=n}\coprod_{j=0}^{j=n}\prod_{k=0}^{k=n}\Gamma_k^{ij}$$

$$\prod_{i=0}^{i=n}\prod_{j=0}^{j=n}\prod_{k=0}^{k=n}\Gamma_k^{ij} = \left(\prod_{i=0}^{i=n}\sum_{j=0}^{j=n}\prod_{k=0}^{k=n}\Gamma_k^{ij}\right) = \left[\sum_{i=0}^{i=n}\sum_{j=0}^{j=n}\sum_{k=0}^{k=n}\Gamma_k^{ij}\right] = \left[\sum_{i=0}^{i=n}\sum_{j=0}^{j=n}\sum_{k=0}^{k=n}\Gamma_k^{ij}\right]$$

$$\bigcup_{i=0}^{i=n}\bigcap_{j=0}^{j=n}\bigcup_{k=0}^{k=n}\Gamma_k^{ij} = \bigcup_{i=0}^{i=n}\bigvee_{j=0}^{j=n}\bigcup_{k=0}^{k=n}\Gamma_k^{ij} = \bigcup_{i=0}^{i=n}\bigwedge_{j=0}^{j=n}\bigcup_{k=0}^{k=n}\Gamma_k^{ij} = \bigvee_{i=0}^{i=n}\bigwedge_{j=0}^{j=n}\bigvee_{k=0}^{k=n}\Gamma_k^{ij}$$

Sums and products, etc., in textstyle:

$$\textstyle \prod\prod\prod\Gamma_k^{ij} = \prod\coprod\prod\Gamma_k^{ij} = \coprod\coprod\coprod\Gamma_k^{ij} = \prod\coprod\prod\Gamma_k^{ij}$$
$$\textstyle \prod\prod\prod\Gamma_k^{ij} = (\prod\sum\prod\Gamma_k^{ij}) = [\sum\sum\sum\Gamma_k^{ij}] = [\sum\sum\sum\Gamma_k^{ij}]$$
$$\textstyle \bigcup\bigcap\bigcup\Gamma_k^{ij} = \bigcup\bigvee\bigcup\Gamma_k^{ij} = \bigcup\bigwedge\bigcup\Gamma_k^{ij} = \bigvee\bigwedge\bigvee\Gamma_k^{ij}$$

10. **Delimiters**

The whole set of extensible delimiters is presented below. Some of those delimiters are quite close to *Computer Modern*'s ones, for instance parentheses are almost the same. By now there are a few differences. Left and right groups are fully supported, i.e. every sizes exist. Moustaches are built in the font but not in a satisfactory way, so that the corresponding control sequences have not been written down. Some vertical lines are not supported, these are the ones that could be built with various extension moduli as in *Computer Modern*.

$$(X,X) = [X,X] = \{X,X\} = \langle X^c, X^c\rangle \equiv [X^c, X^c] = \ulcorner X \urcorner = \llcorner X \lrcorner = \ulcorner X \lrcorner = \llcorner X \urcorner$$

$$(\mathrm{H} \mid \mathrm{O}) = [\mathrm{H} \mid \mathrm{O}] = \{\mathrm{H} \mid \mathrm{O}\} = \langle \mathrm{H} \mid \mathrm{O}\rangle = [\![\mathrm{H} \mid \mathrm{O}]\!] = \lceil \mathrm{H} \mid \mathrm{O}\rceil$$
$$= \lfloor \mathrm{H} \mid \mathrm{O}\rfloor = (\mathrm{H} \mid \mathrm{O}) = |\mathrm{H}| = \|\mathrm{H}\| = |\!|\!|\mathrm{H}|\!|\!| = \uparrow\mathrm{H}\updownarrow\mathrm{H}\downarrow = \Uparrow\mathrm{H}\Updownarrow\mathrm{H}\Downarrow = \sqrt{|}$$

$$\bigl(\mathrm{H} \bigm| \mathrm{O}\bigr) = \bigl[\mathrm{H} \bigm| \mathrm{O}\bigr] = \bigl\{\mathrm{H} \bigm| \mathrm{O}\bigr\} = \bigl\langle \mathrm{H} \bigm| \mathrm{O}\bigr\rangle = \bigl[\![\mathrm{H} \bigm| \mathrm{O}\bigr]\!] = \bigl\lceil \mathrm{H} \bigm| \mathrm{O}\bigr\rceil$$
$$= \bigl\lfloor \mathrm{H} \bigm| \mathrm{O}\bigr\rfloor = \bigl(\mathrm{H} \bigm| \mathrm{O}\bigr) = \bigl|\mathrm{H}\bigr| = \bigl\|\mathrm{H}\bigr\| = \bigl|\!\bigl|\!\bigl|\mathrm{H}\bigr|\!\bigr|\!\bigr| = \bigl\uparrow\mathrm{H}\bigl\updownarrow\mathrm{H}\bigr\downarrow = \bigl\Uparrow\mathrm{H}\bigl\Updownarrow\mathrm{H}\bigr\Downarrow = \bigl\sqrt{\bigr|}$$

$$\Bigl(\mathrm{H} \Bigm| \mathrm{O}\Bigr) = \Bigl[\mathrm{H} \Bigm| \mathrm{O}\Bigr] = \Bigl\{\mathrm{H} \Bigm| \mathrm{O}\Bigr\} = \Bigl\langle \mathrm{H} \Bigm| \mathrm{O}\Bigr\rangle = \Bigl[\![\mathrm{H} \Bigm| \mathrm{O}\Bigr]\!] = \Bigl\lceil \mathrm{H} \Bigm| \mathrm{O}\Bigr\rceil$$
$$= \Bigl\lfloor \mathrm{H} \Bigm| \mathrm{O}\Bigr\rfloor = \Bigl(\mathrm{H} \Bigm| \mathrm{O}\Bigr) = \Bigl|\mathrm{H}\Bigr| = \Bigl\|\mathrm{H}\Bigr\| = \Bigl|\!\Bigl|\!\Bigl|\mathrm{H}\Bigr|\!\Bigr|\!\Bigr| = \Bigl\uparrow\mathrm{H}\Bigl\updownarrow\mathrm{H}\Bigr\downarrow = \Bigl\Uparrow\mathrm{H}\Bigl\Updownarrow\mathrm{H}\Bigr\Downarrow = \Bigl\sqrt{\Bigr|}$$

$$\biggl(\mathrm{H} \biggm| \mathrm{O}\biggr) = \biggl[\mathrm{H} \biggm| \mathrm{O}\biggr] = \biggl\{\mathrm{H} \biggm| \mathrm{O}\biggr\} = \biggl\langle \mathrm{H} \biggm| \mathrm{O}\biggr\rangle = \biggl[\!\!\biggl[\mathrm{H} \biggm| \mathrm{O}\biggr]\!\!\biggr] = \biggl\lceil \mathrm{H} \biggm| \mathrm{O}\biggr\rceil$$
$$= \biggl\lfloor \mathrm{H} \biggm| \mathrm{O}\biggr\rfloor = \biggl(\mathrm{H} \biggm| \mathrm{O}\biggr) = \biggl|\mathrm{H}\biggr| = \biggl\|\mathrm{H}\biggr\| = \biggl|\!\biggl|\!\biggl|\mathrm{H}\biggr|\!\biggr|\!\biggr| = \biggl\uparrow\mathrm{H}\biggl\updownarrow\mathrm{H}\biggr\downarrow = \biggl\Uparrow\mathrm{H}\biggl\Updownarrow\mathrm{H}\biggr\Downarrow = \biggl\sqrt{\biggr|}$$

$$\Biggl(\mathrm{H} \Biggm| \mathrm{O}\Biggr) = \Biggl[\mathrm{H} \Biggm| \mathrm{O}\Biggr] = \Biggl\{\mathrm{H} \Biggm| \mathrm{O}\Biggr\} = \Biggl\langle \mathrm{H} \Biggm| \mathrm{O}\Biggr\rangle = \Biggl[\!\!\Biggl[\mathrm{H} \Biggm| \mathrm{O}\Biggr]\!\!\Biggr] = \Biggl\lceil \mathrm{H} \Biggm| \mathrm{O}\Biggr\rceil$$

$$= \left\lfloor \mathrm{H} \middle| \mathrm{O} \right\rfloor = \left(\mathrm{H} \middle| \mathrm{O} \right) = \left| \mathrm{H} \right| = \left\| \mathrm{H} \right\| = \left|\left\| \mathrm{H} \right\|\right| = \left\uparrow \mathrm{H} \middle\updownarrow \mathrm{H} \right\downarrow = \left\Uparrow \mathrm{H} \middle\Updownarrow \mathrm{H} \right\Downarrow = \sqrt{\left|\vphantom{\mathrm{H}}\right.}$$

$$\left(\mathrm{H} \middle| \mathrm{O} \right) = \left[\mathrm{H} \middle| \mathrm{O} \right] = \left\{ \mathrm{H} \middle| \mathrm{O} \right\} = \left\langle \mathrm{H} \middle| \mathrm{O} \right\rangle = \left[\!\left[\mathrm{H} \middle| \mathrm{O} \right]\!\right] = \left\lceil \mathrm{H} \middle| \mathrm{O} \right\rceil$$

$$= \left\lfloor \mathrm{H} \middle| \mathrm{O} \right\rfloor = \left(\mathrm{H} \middle| \mathrm{O} \right) = \left| \mathrm{H} \right| = \left\| \mathrm{H} \right\| = \left|\left\| \mathrm{H} \right\|\right| = \left\uparrow \mathrm{H} \middle\updownarrow \mathrm{H} \right\downarrow = \left\Uparrow \mathrm{H} \middle\Updownarrow \mathrm{H} \right\Downarrow = \sqrt{\left|\vphantom{\mathrm{H}}\right.}$$

11. **Accents and wide accents**

Here are some basic accents.

`\ring o` $\mathring{o}$, `\dot o` $\dot{o}$, `\ddot o` $\ddot{o}$, `\dddot o` $\dddot{o}$, `\ddddot o` $\ddddot{o}$,

Thus,

$$\ddddot{y} - 4\dddot{y} + 5x\ddot{y} + f(x)\dot{y} = g(x) \in \mathring{C}$$

Here we have extensible accents. Control sequences `\oldxxx` just invoke former symbols when they exist, these control sequence are defined only for this test file.

`\widehat`	$\widehat{I} = \widehat{H} = \widehat{II} = \widehat{III} = \widehat{IIII} = \widehat{IIIII} = \widehat{IIIIII} = \widehat{IIIIIIII}$
`\oldwidehat`	$\widehat{I} = \widehat{H} = \widehat{II} = \widehat{III} = \widehat{IIII} = \widehat{IIIII} = \widehat{IIIIII} = \widehat{IIIIIIII}$
`\widecheck`	$\widecheck{I} = \widecheck{H} = \widecheck{II} = \widecheck{III} = \widecheck{IIII} = \widecheck{IIIII} = \widecheck{IIIIII} = \widecheck{IIIIIIII}$
`\widetilde`	$\widetilde{I} = \widetilde{H} = \widetilde{II} = \widetilde{III} = \widetilde{IIII} = \widetilde{IIIII} = \widetilde{IIIIII} = \widetilde{IIIIIIII}$
`\oldwidetilde`	$\widetilde{I} = \widetilde{H} = \widetilde{II} = \widetilde{III} = \widetilde{IIII} = \widetilde{IIIII} = \widetilde{IIIIII} = \widetilde{IIIIIIII}$
`\widearrow`	$\overrightarrow{I} = \overrightarrow{H} = \overrightarrow{II} = \overrightarrow{III} = \overrightarrow{IIII} = \overrightarrow{IIIII} = \overrightarrow{IIIIII} = \overrightarrow{IIIIIIII}$
`\wideparen`	$\overparen{I} = \overparen{H} = \overparen{II} = \overparen{III} = \overparen{IIII} = \overparen{IIIII} = \overparen{IIIIII} = \overparen{IIIIIIII}$
`\widering`	$\overset{\circ}{\overparen{I}} = \overset{\circ}{\overparen{H}} = \overset{\circ}{\overparen{II}} = \overset{\circ}{\overparen{III}} = \overset{\circ}{\overparen{IIII}} = \overset{\circ}{\overparen{IIIII}} = \overset{\circ}{\overparen{IIIIII}} = \overset{\circ}{\overparen{IIIIIIII}}$
`\widedot`	$\dot{\overparen{I}} = \dot{\overparen{H}} = \dot{\overparen{II}} = \dot{\overparen{III}} = \dot{\overparen{IIII}} = \dot{\overparen{IIIII}} = \dot{\overparen{IIIIII}} = \dot{\overparen{IIIIIIII}}$
`\wideddot`	$\ddot{\overparen{I}} = \ddot{\overparen{H}} = \ddot{\overparen{II}} = \ddot{\overparen{III}} = \ddot{\overparen{IIII}} = \ddot{\overparen{IIIII}} = \ddot{\overparen{IIIIII}} = \ddot{\overparen{IIIIIIII}}$
`\widedddot`	$\dddot{\overparen{I}} = \dddot{\overparen{H}} = \dddot{\overparen{II}} = \dddot{\overparen{III}} = \dddot{\overparen{IIII}} = \dddot{\overparen{IIIII}} = \dddot{\overparen{IIIIII}} = \dddot{\overparen{IIIIIIII}}$
`\wideddddot`	$\ddddot{\overparen{I}} = \ddddot{\overparen{H}} = \ddddot{\overparen{II}} = \ddddot{\overparen{III}} = \ddddot{\overparen{IIII}} = \ddddot{\overparen{IIIII}} = \ddddot{\overparen{IIIIII}} = \ddddot{\overparen{IIIIIIII}}$
`\widebar`	$\overline{I} = \overline{H} = \overline{II} = \overline{III} = \overline{IIII} = \overline{IIIII} = \overline{IIIIII} = \overline{IIIIIIII}$
`\overleftarrow` is not of accent type	$\overleftarrow{IIIIIIIIIIIIIIIIIIIIIIIIIIII}$

According to Matthias Clasen's construction: `\overbrace`, `\underbrace`, `\overgroup`, `\undergroup`

$$\overbrace{\underbrace{HHHHHHHHHHH}_{HHHHHHHHHHH}}^{AAAAAAAAAAAA} \qquad \overgroup{\undergroup{HHHHHHHHHHH}_{HHHHHHHHHHH}}^{AAAAAAAAAAAA}$$

12. Astronomical symbols

Astronomical/logical symbols are in progress (coding, design, etc.). There is not enough room yet in the *mathb* series to provide a complete set of such symbols. If Mayan numerals are supressed, maybe...

> The Earth ⊕ (or ♁) is in rotation around the Sun ⊙ like Mercury ☿, Venus ♀, Mars ♂, Saturn ♄, Jupiter ♃, Uranus ⛢, Neptune Ψ and Pluto ♇. But the Moon ☾ is not.

Also, there are Aries ♈, Taurus ♉, Gemini ♊, Leo ♌, Libra ♎, Scorpio ♏, etc. (Notice the use of `\lfilet` and `\rfilet` in the previous paragraph—which names may be changed.)

Of course, some symbols have an *alias* such as `\girl` and `\boy`:

{(♂, ♂), (♂, ♀), (♀, ♂), (♀, ♀)}.

These symbols are nice in some usual exercices of elementary Probability Theory.

The `\rip` sign is mostly for fun. It is not an astronomical/logical symbol but is located among them in *mathb*. In the Theory of Markov Processes, a cemetery sign is often needed. We have designed the following ugly and not so necessary one: ‡‡‡‡. Many successive `\rip` signs glue to each others.

13. Unsupported

As one can see further on, many things are unsupported. But this does not mean that few things extracted from unsupported stuff are not interesting. Below, one can see some shape that comes from my favorite pen and another I saw once on the web and thought it was astonishingly beautiful.

See mathc10, mathu10, mathux10 in the next pages.

14. Mathabx font tables

Matha, major symbols series.

matha10	´0	´1	´2	´3	´4	´5	´6	´7	
´00x	+	−	×	÷	·	∘	∗	✻	″0x
´01x	±	∓	⋉	⋊	⋄	•	⋆	✶	
´02x	=	≡	∼	≈	≃	≅	≍	∣	″1x
´03x	≠	≢	≁	≉	≄	≇	≭	∤	
´04x	¬	≪	≫	⋕	⊢	⊣	⊬	⊬	″2x
´05x	⊨	⫤	⊭	⊭	⊩	⫣	⊮	⊮	
´06x	∘	′	″	‴	⁗	♭	♮	♯	″3x
´07x	∞	∝	†	‡	Σ	Π	∐	√	
´10x	∀	∁	∂	∂̸	∃	∄	Ⅎ	⅁	″4x
´11x	∅	∅	⊤	⊥	⊤̸	⊥̸	⋏	⋎	
´12x	∈	∋	∉	∌	⋵	⋽	⋶	⋽	″5x
´13x	∩	∪	⊎	⊓	⊔	⩏	∧	∨	
´14x	⊕	⊖	⊗	⨸	⊙	⊚	⊛	⊛	″6x
´15x	⦶	⦶	⦵	⦵	◯	⊘	⦸	⟁	
´16x	(	)	[	]	{	}	⟦	⟧	″7x
´17x	⟨	⟩	\	/	|	‖	⦀	|	
´20x	⊂	⊃	⊄	⊅	⊆	⊇	⊈	⊉	″8x
´21x	⊊	⊋	⊊	⊋	⫅	⫆	⊈	⊉	
´22x	⫋	⫌	⫋	⫌	⋐	⋑	⋐̸	⋑̸	″9x
´23x	◁	▷	⋪	⋫	⊴	⊵	⋬	⋭	
´24x	<	>	≮	≯	⩽	⩾	⩽̸	⩾̸	″Ax
´25x	≤	≥	≰	≱	≨	≩	≦	≧	
´26x	≦̸	≧̸	≨	≩	⪇	⪈	<	>	″Bx
´27x	≮	≯	≶	≷	⋚	⋛	⪋	⪌	
´30x	≲	≳	≴	≵	⪉	⪊	⪅	⪆	″Cx
´31x	⪅̸	⪆̸	⪋	⪌	⋖	⋗	≪	≫	
´32x	←	→	↑	↓	↖	↗	↙	↘	″Dx
´33x	↔	↕	↚	↛	↮	−	¦	¦	
´34x	↼	⇀	↽	⇁	↿	⇃	↾	⇂	″Ex
´35x	⇋	⇌	⥮	⥯					
´36x	⇐	⇒	⇑	⇓	⇔	⇕	⇍	⇏	″Fx
´37x	⇎	=	¦	¦					
	″8	″9	″A	″B	″C	″D	″E	″F	

Mathb, minor symbols series.

mathb10	´0	´1	´2	´3	´4	´5	´6	´7	
´00x	∔	∸	⨰	⨪	·	▫	✻	✲	″0x
´01x	⨢	⌖	✳	⋇	◆	■	★	✶	
´02x	≐	⩦	≑	≓	≒	≔	≕	≏	″1x
´03x	≚	≎	≗	≖	≜	≙			
´04x	≬	⌣	⌢	#	⋋	⋌	⋔	⋈	″2x
´05x	⊫	⫥	⊯	⫥̸	⊪	⫣	⊪̸	⫣̸	
´06x	⦶	·	∶	⋮	⁞	∣	∴	∵	″3x
´07x	˚	˙	¨	⋯	····	∠	∡̸	∢̸	
´10x	☉	☿	♀	⊕	♂	♃	♄	⛢	″4x
´11x	♆	♇	♁	☾	☽	○	●	⚳	
´12x	♈	♉	♊		♌		♎	♏	″5x
´13x	⊼	⊻	⩞	⩣	⋒	⋓	⩎	⩏	
´14x	⊞	⊟	⊠	⌹	⊡	⧇	⧆	⧆	″6x
´15x	◰	◳	◱	◲	□	⧄	⧅	⟁	
´16x	(	)	⌈	⌉	⌊	⌋	⸢⸤	⸣⸥	″7x
´17x	⸢	⸣	⸤	⸥	\	/	∣	/	
´20x	⊏	⊐	⊏̸	⊐̸	⊑	⊒	⋢	⋣	″8x
´21x	⋤	⋥	⋤	⋥	⊑̳	⊒̳	⋢̳	⋣̳	
´22x	⋤̳	⋥̳	⋤̳	⋥̳	⋐	⋑	⋐̸	⋑̸	″9x
´23x	▵	▿	◃	▹	▴	▾	◂	▸	
´24x	≺	≻	⊀	⊁	≼	≽	⋠	⋡	″Ax
´25x	⪯	⪰	⪯̸	⪰̸	⪱	⪲	⪳	⪴	
´26x	⪳̸	⪴̸	⪵	⪶	⪵	⪶	⊰	⊱	″Bx
´27x	⊀	⊁	≶	≷	⋚	⋛	⪋	⪌	
´30x	≾	≿	≾̸	≿̸	⋨	⋩	⪷	⪸	″Cx
´31x	⪷̸	⪸̸	⪹	⪺	⋖	⋗	⪻	⪼	
´32x	⇇	⇉	⇈	⇊	⇆	⇄	⇅	⇵	″Dx
´33x	⇐	⇒	⇑	⇓	⥪	⥬	⥫	⥭	
´34x	⥊	⥋	ↄ	c	╱	╲			″Ex
´35x	↰	↱	↲	↳	↫	↬	⟜	⊸	
´36x	↶	↷	⤺	⤹	⤸	⤻	↺	↻	″Fx
´37x	⬳	⇝	↭		⤾	⤿	⟲	⟳	
	″8	″9	″A	″B	″C	″D	″E	″F	

Mathx, major extensible symbols series.

mathx10	´0	´1	´2	´3	´4	´5	´6	´7	
´00x	(	(	(	(	⎛	⎝	⎢	⎢	"0x
´01x	)	)	)	)	⎞	⎠	⎥	‖	
´02x	[	[	[	[	⎡	⎣	⎢	⦀	"1x
´03x	]	]	]	]	⎤	⎦	⎥	⎥	
´04x	{	{	{	{	⎧	⎩	⎨	⎪	"2x
´05x	}	}	}	}	⎫	⎭	⎬	⎪	
´06x	⟦	⟦	⟦	⟦	⟦	⟦	‖	⎨	"3x
´07x	⟧	⟧	⟧	⟧	⟧	⟧	‖	⎬	
´10x	⟨	⟨	⟨	⟨	⟩	⟩	⟩	⟩	"4x
´11x	\	\	\	\	/	/	/	/	
´12x	⌈	⌈	⌈	⌈	⌉	⌉	⌉	⌉	"5x
´13x	⌊	⌊	⌊	⌊	⌋	⌋	⌋	⌋	
´14x	√	√	√	√	√	⎷	⎸	┌	"6x
´15x	╭	⏞	╮	─	╰	⏟	╯	─	
´16x	^	ˇ	~	¯	→	⌢	(	)	"7x
´17x	^	^	^	^	ˇ	ˇ	ˇ	ˇ	
´20x	~	~	~	~	—	—	—	—	"8x
´21x	→	→	→	→	⌢	⌢	⌢	⌢	

´22x	+	×	∁	⋂	⋃	⊎	⊓	⊔	″9x
´23x	⊞	⋀	⋁	⋏	⋎	↑	↓	|	
´24x	+	×	∁	⋂	⋃	⊎	⊓	⊔	″Ax
´25x	⊞	⋀	⋁	⋏	⋎	⇑	⇓	‖	
´26x	∑	∏	∐	∫	∬	∭	∮	∯	″Bx
´27x	∑	∏	∐	∫	∬	∭	∮	∯	
´30x	⊕	⊖	⊗	⨸	⊙	⊚	⊛	⊛	″Cx
´31x	⦶	⦶	⦶	⦶	○	⊘	⦸	⟁	
´32x	⊞	⊟	⊠	⊞	⊡	⧇	⧆	⧆	″Dx
´33x	⊞	⊞	⊞	⊞	□	⧄	⧅	⧋	
´34x	⊕	⊖	⊗	⨸	⊙	⊚	⊛	⊛	″Ex
´35x	⦶	⦶	⦶	⦶	○	⊘	⦸	⟁	
´36x	⊞	⊟	⊠	⊞	⊡	⧇	⧆	⧆	″Fx
´37x	⊞	⊞	⊞	⊞	□	⧄	⧅	⧋	
	″8	″9	″A	″B	″C	″D	″E	″F	

Mathc, unsupported calligraphic series. *The series* mathc *have some features that may interest people: it contains the whole set of calligraphic characters of* `cmsy` *and also extends it. The first part of this extension is the latin lowercase letters, and also the punctuation which make it a quite complete OT1 font. This part of the extension is due to me. Hebrew characters have been converted to MetaFont, adapted and extended (dagesh sign) also by me, but the source is some "professional" or commercial font.*

Things are in progress: ‹ punctuation ›, « ligatures », greek letters... Designs are deeply based on Computer Modern*. Thus these series should be named cmchXX...*

mathc10/cmsy10

AA$_{65}$ BB$_{66}$ CC$_{67}$ DD$_{68}$ EE$_{69}$ FF$_{70}$ GG$_{71}$ HH$_{72}$ II$_{73}$ JJ$_{74}$ KK$_{75}$ LL$_{76}$ MM$_{77}$ NN$_{78}$ OO$_{79}$ PP$_{80}$ QQ$_{81}$ RR$_{82}$ SS$_{83}$ TT$_{84}$ UU$_{85}$ VV$_{86}$ WW$_{87}$ XX$_{88}$ YY$_{89}$ ZZ$_{90}$

cmsy10/cmmi10

AA$_{65}$ BB$_{66}$ CC$_{67}$ DD$_{68}$ EE$_{69}$ FF$_{70}$ GG$_{71}$ HH$_{72}$ II$_{73}$ JJ$_{74}$ KK$_{75}$ LL$_{76}$ MM$_{77}$ NN$_{78}$ OO$_{79}$ PP$_{80}$ QQ$_{81}$ RR$_{82}$ SS$_{83}$ TT$_{84}$ UU$_{85}$ VV$_{86}$ WW$_{87}$ XX$_{88}$ YY$_{89}$ ZZ$_{90}$

mathc10/cmmi10

AA$_{65}$ BB$_{66}$ CC$_{67}$ DD$_{68}$ EE$_{69}$ FF$_{70}$ GG$_{71}$ HH$_{72}$ II$_{73}$ JJ$_{74}$ KK$_{75}$ LL$_{76}$ MM$_{77}$ NN$_{78}$ OO$_{79}$ PP$_{80}$ QQ$_{81}$ RR$_{82}$ SS$_{83}$ TT$_{84}$ UU$_{85}$ VV$_{86}$ WW$_{87}$ XX$_{88}$ YY$_{89}$ ZZ$_{90}$

mathc10/cmmi10

aa$_{97}$ bb$_{98}$ cc$_{99}$ dd$_{100}$ ee$_{101}$ ff$_{102}$ gg$_{103}$ hh$_{104}$ ii$_{105}$ jj$_{106}$ kk$_{107}$ ll$_{108}$ mm$_{109}$ nn$_{110}$ oo$_{111}$ pp$_{112}$ qq$_{113}$ rr$_{114}$ ss$_{115}$ tt$_{116}$ uu$_{117}$ vv$_{118}$ ww$_{119}$ xx$_{120}$ yy$_{121}$ zz$_{122}$

mathc10	´0	´1	´2	´3	´4	´5	´6	´7	
´00x	¿	¡	«	»					˝0x
´01x									
´02x	ı	ȷ	`	´	ˇ	˘	¯	˚	˝1x
´03x	¸	ß	æ	œ	ø	Æ	Œ	Ø	
´04x		!	”	#			&	’	˝2x
´05x	(	)	*	+	,	-	.	/	
´06x	0	1	2	3	4	5	6	7	˝3x
´07x	8	9	:	;	‹	=	›	?	
´10x	@	A	B	C	D	E	F	G	˝4x
´11x	H	I	J	K	L	M	N	O	
´12x	P	Q	R	S	T	U	V	W	˝5x
´13x	X	Y	Z	[	“	]	ˆ	˙	
´14x	‘	a	b	c	d	e	f	g	˝6x
´15x	h	i	j	k	l	m	n	o	
´16x	p	q	r	s	t	u	v	w	˝7x
´17x	x	y	z	–	—	˝	˜	¨	
´20x		A	B	T		E	Z	H	˝8x
´21x	Θ	I	K	Λ	M	N		O	

´22x	$\mathcal{\Pi}$	$\mathcal{P}$		$\mathcal{T}$			$\mathcal{X}$		˝9x
´23x									
´24x		α	β	γ		ε		η	˝Ax
´25x	θ	κ		μ	ν			o	
´26x	π	ρ			υ	ϕ	χ	ψ	˝Bx
´27x			ϑ			ϱ		φ	
´30x	א	ב	ג	ד	ה	ו	ז	ח	˝Cx
´31x	ט	י	ך	כ	ל	ם	מ	ן	
´32x	נ	ס	ע	ף	פ	ץ	צ	ק	˝Dx
´33x	ר	ש	ת						
´34x	אּ	בּ	גּ	דּ	הּ	וּ	זּ	חּ	˝Ex
´35x	טּ	יּ	ךּ	כּ	לּ	םּ	מּ	ןּ	
´36x	נּ	סּ	עּ	ףּ	פּ	ץּ	צּ	קּ	˝Fx
´37x	רּ	שּ	תּ						
	˝8	˝9	˝A	˝B	˝C	˝D	˝E	˝F	

On November 14, 1885, Senator & Mrs. Leland Stanford called together at their San Francisco mansion the 24 prominent men who had been chosen as the first trustees of The Leland Stanford Junior University. They handed to the board the Founding Grant of the University, which they had executed three days before. This document—with various amendments, legislative acts, and court decrees—remains as the University's charter. In bold, sweeping language it stipulates that the objectives of the University are "to qualify students for personal success and direct usefulness in life; and to promote the publick welfare by exercising an influence in behalf of humanity and civilization, teaching the blessings of liberty regulated by law, and inculcating love and reverence for the great principles of government as derived from the inalienable rights of man to life, liberty, and the pursuit of happiness." ¿But aren't Kafka's Schloß and Æsop's Œuvres often naïve vis-à-vis the dæmonic phœnix's official rôle in fluffy soufflés? (¡THE DAZED BROWN FOX QUICKLY GAVE 12345–67890 JUMPS!)
Ångelå Beatrice Claire Diana Érica Françoise Ginette Hélène Iris Jackie Kāren Laưra María Nắtalĭe Øctave Pauline Quêneau Roxanne Sabine Tãja Uršula Vivian Wendy Xanthippe Yvønne Zäzilie

Random test of gray.

xmmijtfkyyyoppzpdhcwiepmwbxmlrbsyaefxptmwcb
lssnyzywouvqccdheyumkjbmmfrqoixmfwciqxmsogg
jgddhaqabbmcxdcwodvszfkzmdnwhbgyapceewmfatn
dtpzukiahhalgmpzhnvfycfigqompzsxtiyxyujknmd
xupgijvumucrptclsrokalcoajhkxptofdkmcimpiqn
sxtabaqpmqsaggukkmygfthozfvywtafyvblvcylhkg
hmudbcofzrgglspmkgciboqkdrnkpoqzbyxgzspwvnd
xagqbbukuzbfwzcblawmghytfcpycbnbxteahuejtjc
iimqjwiqheytmfzojnpvuwssafkprnrlqugriufeusj
ntxrkamqujkhdvhpwwusqfebysjemjtrcjymzyzebeb

futrkrsqucawgfgjhivkhyjipgrsbmmpxumnmtvbvfw
ltmdhbcxuqwjotzwmtshaifxhyvvexrahmvbsceatsg
dozciwslmbhjtmbrutfbknroikfurnjnfimedcncilg
lvccpfuyfjkyhferrywzgegofezpfdfuthxievxdlbj
tgjewujwebhrtqhbuhmfgmqymsxtznnxgivahxlsexj
hdmkfezuuaxjackjlpfevkwququkulneohmopticxuo
jqopdqcykjmdbenrtevfgfhjzpmxwkjssjtybtkbdnm
rjjtexycfngrpmrehqdvhtxnfusafxwhkkufbrkrbnf
shernvthouglabstmfdbfhrogmsbgxtyhaxhlneynxx
idlbddlrwppnadyvdkjonbuwvxocpfzsecxhjztpvfz
hbtdwjhtovjudcoikryzrmyyrugfqfxnhoxkuuqnmei
jhdwcjoaotbffymwrqoxlssyflcyzsaxtnstdcnvohp
vnaedlynvegxjkxomsztniqfcnqwowqelvizydjfrou
beddhaxvxrfkrpnhcllhksvkulcficnfaqfqtltooyp
vgahdhvwrednweurazfrgajxkoohunhqzmoexfbqlsa

ϑηϕανπμμνευχηηαυμγμεπεμψνκ
μμϑοβρευπψκϱβψϑπϕηγνϱγν
οϕπηχηφκμοϕϱϱφρψθϱανϑφεγυαθχ
νρφνβψθπβψφοηκχεαεχυρκνε
οηϑηγνροοφνθρπϱνκκβμκμψϱβεϑρ
ϕϑββπϱβμυβπποψϑϕηυηαροοηϱβψ
ρυπμαψεγκοοψηφεβηοαεϱγκεϱφφαρπμ
κφθχπμρχηχνϕεημηϕνϑψφμοθϑυθχν
νθβθηβυβκϕποφϕκθοφοονρϕυχ
βϑρνυηκβγφφϱϕϑκηεγφνεμβηβϑ
ϱϑϕγμϕϑργπϱψεοερχπυϕϑϱοψϕϑ
ννϑχθρηρϕοθθφρϱθμφθφα
ορεθχευχνκϱαϱηϑεϕυοογ
ρμγαϱηεπϕομϱχκψϑργεψμϑυααεο
ϱϑεϱθγμηφχϑαμϕφγυϕψννγπρηψ
χχχφρκεφκβνηϕρϑϑκϑϑϑβψχρθυπκϱκ
πβαχϑφααθψμϑθπηυεο
ψκθρχγυνϕακραϑακπ
ϑηθβοβνβϱχϕφνγφφγππϱυθϑϕμθχγ
ημγνχϕψϑπερεαρκψθγϑαποχψϑ
χαχβεϱϱηβϕνεψργψαεϱαχπααχβπ
ψνϕαεμϕευκορυοπψηενϑθυϑυθ
ρνϕκψκϑϕμχθηρϱϑργϑπϱκμθγα
πψϕκβχυχψππβϕηχογθϕγκμοχϕκκχ
κϑοϑψηβϕϱψεοκκθψψϑμαυψϱοθ

00010203040506070809 0
10111213141516171819 1
20212223242526272829 2
30313233343536373839 3
40414243444546474849 4
50515253545556575859 5
60616263646566676869 6

707172737475767778797
808182838485868788898
909192939495969798999

Mathu, unsupported symbols series.

mathu10	´0	´1	´2	´3	´4	´5	´6	´7	
´20x	▵	▿	◃	▹	▴	▾	◂	▸	″8x
´21x	△	▽	◁	▷	▲	▼	◀	▶	
´22x	\	⌣	⌢	≋	≋̸	≈	≄	≀	″9x
´23x	∽	⋍	⚛	Ƨ	⌐	卐	⩔	⋇	
´24x	⌒̇	◡̇	⊓̇	⊔̇					″Ax
´25x									
´26x	□	⬠	⬡	⎔	◇	⬠	⬡	◯	″Bx
´27x	☆	★	✡	✶	◷	◶	◵	◴	
´30x	⦶	⦵	⊙	⍟	⊛	⊽	⧀	⧁	″Cx
´31x	⨸	⨸	⊖	⦶	⊕	⊗	⦻	⦼	
´32x	◐	◑	◓	◒	◕	◕	◕	◕	″Dx
´33x	☯	☮							
´34x	⊤⃞	⊥⃞	⊡	★⃞	✶⃞	▽⃞	◁⃞	▷⃞	″Ex
´35x	÷⃞	÷⃞	⊟	◫	⊞	⊠	Λ⃞	V⃞	
´36x	◧	◨	⬒	⬓	◩	⬕	◪	⬔	″Fx
´37x	☯⃞	☮⃞							
	″8	″9	″A	″B	″C	″D	″E	″F	

Mathux, unsupported extensible symbols series.

mathux10	´0	´1	´2	´3	´4	´5	´6	´7	
´10x				⊂		∪	∩		″4x
´11x	△	▽			⊤	⊤	⊥	⊥	
´12x	∫	∲	∳	⨍	⨒	⨓			″5x
´13x									
´20x	⦶	⦵	⊙	⍟	⊛	⊽	⧀	⧁	″8x
´21x	⨸	⨸	⊖	⦶	⊕	⊗	⦻	⦼	
´22x	◐	◑	◓	◒	◕	◕	◕	◕	″9x
´23x	☯	☮							
´24x	⊤⃞	⊥⃞	⊡	★⃞	✶⃞	▽⃞	◁⃞	▷⃞	″Ax
´25x	÷⃞	÷⃞	⊟	◫	⊞	⊠	Λ⃞	V⃞	
´26x	◧	◨	⬒	⬓	◩	⬕	◪	⬔	″Bx
´27x	☯⃞	☮⃞							
´30x	⦶	⦵	⊙	⍟	⊛	⊽	⧀	⧁	″Cx
´31x	⨸	⨸	⊖	⦶	⊕	⊗	⦻	⦼	

´32x	◐	◑	◒	◓	◩	⬔	◪	◩	″Dx
´33x	☯	☮							
´34x	⊤⃞	⊥⃞	⊡	★⃞	✶⃞	▽⃞	◁⃞	▷⃞	″Ex
´35x	⍐	⍗	⊟	⎅	⊞	⊠	△⃞	▽⃞	
´36x	◧	◨	⬒	⬓	◩	⬔	⬕	◪	″Fx
´37x	☯⃞	☮⃞							
	″8	″9	″A	″B	″C	″D	″E	″F	

Mathastrotest10, about the metaness of astronomical/logical symbols. Who cares about astronomical/logical symbols? So why trying to do something great with them? General shapes are even unstable: they are never the same from a reference to another. I think that I've been convinced by the presence of some such symbols in the fonts tables of the famous book "The Printing of Mathematics". By the way it remembers me that if I want to extend this subset of *mathb*, I would have to take into account that I have already put some metaness in these designs.

⊙⊙⊙⊙⊙⊙⊙⊙ ☿☿☿☿☿☿☿☿ ♀♀♀♀♀♀♀♀ ⊕⊕⊕⊕⊕⊕⊕⊕ ♂♂♂♂♂♂♂♂ ♃♃♃♃♃♃♃♃
♄♄♄♄♄♄♄♄ ⛢⛢⛢⛢⛢⛢⛢⛢ ♆♆♆♆♆♆♆♆ ♇♇♇♇♇♇♇♇ ♁♁♁♁♁♁♁♁ ☾☾☾☾☾☾☾☾
☽☽☽☽☽☽☽☽ ○○○○○○○○ ●●●●●●●● ♈♈♈♈♈♈♈♈ ♉♉♉♉♉♉♉♉
♊♊♊♊♊♊♊♊ ♌♌♌♌♌♌♌♌ ♎♎♎♎♎♎♎♎
♏♏♏♏♏♏♏♏ ♐♐♐♐♐♐♐♐ ♓♓♓♓♓♓♓♓

mathastrotest10	´0	´1	´2	´3	´4	´5	´6	´7	
´00x	⊙	☿	♀	⊕	♂	♃	♄	⛢	″0x
´01x	♆	♇	♁	☾	☽	○	●		
´02x	♈	♉	♊		♌		♎	♏	″1x
´03x	♐			♓					
´04x	⊙	☿	♀	⊕	♂	♃	♄	⛢	″2x
´05x	♆	♇	♁	☾	☽	○	●		
´06x	♈	♉	♊		♌		♎	♏	″3x
´07x	♐			♓					
´10x	⊙	☿	♀	⊕	♂	♃	♄	⛢	″4x
´11x	♆	♇	♁	☾	☽	○	●		
´12x	♈	♉	♊		♌		♎	♏	″5x
´13x	♐			♓					
´14x	⊙	☿	♀	⊕	♂	♃	♄	⛢	″6x
´15x	♆	♇	♁	☾	☽	○	●		
´16x	♈	♉	♊		♌		♎	♏	″7x
´17x	♐			♓					
´20x	⊙	☿	♀	⊕	♂	♃	♄	⛢	″8x
´21x	♆	♇	♁	☾	☽	○	●		

´22x	♈	♉	♊		♌		♎	♏	″9x
´23x	♐			♓					
´24x	☉	☿	♀	⊕	♂	♃	♄	♅	″Ax
´25x	♆	♇	♁	☾	☽	○	●		
´26x	♈	♉	♊		♌		♎	♏	″Bx
´27x	♐			♓					
´30x	☉	☿	♀	⊕	♂	♃	♄	♅	″Cx
´31x	♆	♇	♁	☾	☽	○	●		
´32x	♈	♉	♊		♌		♎	♏	″Dx
´33x	♐			♓					
´34x	☉	☿	♀	⊕	♂	♃	♄	♅	″Ex
´35x	♆	♇	♁	☾	☽	○	●		
´36x	♈	♉	♊		♌		♎	♏	″Fx
´37x	♐			♓					
	″8	″9	″A	″B	″C	″D	″E	″F	