My humble additions to (La)TeX mathematics[*]

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Abstract

This package provides a set of big delimiters, intermediate to those of the original TeX, and also much bigger. It also provides very wide accents (including two new ones: parenthesis and triangle). These symbols are included in a font which has Don's `cmex10` as lower ASCII part.

1   Installation

This package consists of (a) a font, written in Metafont, (b) a LaTeX style file, (c) a FD file for the OMX encoding using the new font. To build the font put all the Metafont files somewhere where your Metafont can find them (for example in texmf/fonts/src/public/yhmath)

Then launch Metafont at least once on `yhcmex10` so that at least one TFM file exists when you'll start typesetting (`dvips` and similar programs will create the PKs, don't worry).

Then take the `OMXyhex.fd` file and put it together with your other FD (Font Definition) files; and `yhmath.sty` together with your other LaTeX styles. Have fun!

2   Availability

Don Knuth's code is included in Metafont files, so this code is under the usual TeXware ©opyright conditions. My code is postcard-ware (if you like it and find it is worth a postcard + a stamp + the mental effort of writing a word [optional!] and the physical effort of going to the nearest mailbox, then do it!).

Everything is on CTAN, and if there are upgrades you will be informed in the usual way.

3   Very big delimiters

I never liked those parentheses of matrices which become almost immediately straight. In traditional math typography, parentheses stay curved, even if they are very big. So I decided to play around with TeX's `charlist` font property, and

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make some more of those big delimiters. I also did intermediate sizes (for all "big" delimiters). Here are some examples :

$$\begin{pmatrix} a & b \\ c & d \end{pmatrix} \begin{pmatrix} a & b & c \\ d & e & f \\ g & h & i \end{pmatrix} \begin{pmatrix} a & b & c & d \\ e & f & g & h \\ i & j & k & l \\ m & n & o & p \end{pmatrix} \tag{1}$$

$$\begin{pmatrix} a & b & c & d & e \\ f & g & h & i & j \\ k & l & m & n & o \\ p & q & r & s & t \\ u & v & w & x & y \end{pmatrix} \begin{pmatrix} a & b & c & d & e & f \\ g & h & i & j & k & l \\ m & n & o & p & q & r \\ s & t & u & v & w & x \\ y & z & \alpha & \beta & \gamma & \delta \end{pmatrix} \tag{2}$$

4 A new $\mathcal{AMS}$-LaTeX-like matrice-like environnement

Since I did also "very big" versions of the "left angle" and "right angle" symbols, why not making "matrices" with them as delimiters? I have never seen such a mathematical object, but perhaps was it just because this constructions wasn't available yet? (this is a chicken and egg story).

amatrix   I called this new $\mathcal{AMS}$-LaTeX-like environment amatrix ("a" for "angle"). I hope AMS people will just love it and include it into $\mathcal{AMS}$-LaTeX![1]

Here are the same matrices as above, with angles instead of parentheses:

$$\left\langle\begin{matrix} a & b \\ c & d \end{matrix}\right\rangle \left\langle\begin{matrix} a & b & c \\ d & e & f \\ g & h & i \end{matrix}\right\rangle \left\langle\begin{matrix} a & b & c & d \\ e & f & g & h \\ i & j & k & l \\ m & n & o & p \end{matrix}\right\rangle \tag{3}$$

$$\left\langle\begin{matrix} a & b & c & d & e \\ f & g & h & i & j \\ k & l & m & n & o \\ p & q & r & s & t \\ u & v & w & x & y \end{matrix}\right\rangle \left\langle\begin{matrix} a & b & c & d & e & f \\ g & h & i & j & k & l \\ m & n & o & p & q & r \\ s & t & u & v & w & x \\ y & z & \alpha & \beta & \gamma & \delta \end{matrix}\right\rangle \tag{4}$$

5 New roots

Roots got bigger as well, so that now the "vertical root" comes much later. Example :

$$\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{x}}}}}}}}}}$$

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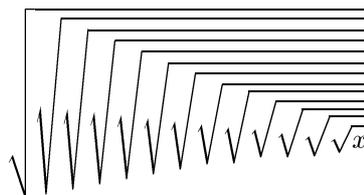
[1]Talking of $\mathcal{AMS}$-LaTeX there are a few more macros I would like to see included, see next section.

6 A few things missing from $\mathcal{AMS}$-LaTeX v1.2

\adots In $\mathcal{AMS}$-LaTeX there is a \ddots command for diagonal dots. How about antidiagonal ones? There are matrices called anti-symmetric, and for them we need the notation "dots going up". I define a \adots macro, with a code symetric to \ddots, here is the result: $\cdot^{\cdot^{\cdot}}$.

\ring Another thing missing in all TeX & Co. packages: the ring accent, used in topology for the interior of a space. I define a macro \ring to be used in math mode. Here is the result: if $X = [0,1]$ then $\mathring{X} =]0,1[$.

7 Very wide accents

\widetriangle
\wideparen I added some more hats and tildes, so that you can get really wide accents now; see the examples below:

$$\widehat{A}, \widehat{AB}, \widehat{ABC}, \widehat{ABCD}, \widehat{ABCDE}, \widehat{ABCDEF}, \widehat{ABCDEFG}$$

$$\widetilde{A}, \widetilde{AB}, \widetilde{ABC}, \widetilde{ABCD}, \widetilde{ABCDE}, \widetilde{ABCDEF}, \widetilde{ABCDEFG}$$

I also designed two new accents: the triangle accent \widetriangle and the parenthesis accent \wideparen:

$$\widetriangle{A}, \widetriangle{AB}, \widetriangle{ABC}, \widetriangle{ABCD}, \widetriangle{ABCDE}, \widetriangle{ABCDEF}, \widetriangle{ABCDEFG}$$

$$\wideparen{A}, \wideparen{AB}, \wideparen{ABC}, \wideparen{ABCD}, \wideparen{ABCDE}, \wideparen{ABCDEF}, \wideparen{ABCDEFG}$$

The former is used (in France only??) to show that the notation ABC, where A, B, C are three points, means a triangle and not an angle. See what I mean? $\widetriangle{ABC}$ is a triangle, $\widehat{ABC}$ is an angle.

The latter is used when we want a non-expansible accent to be applied to more than one letters at once. Of course $\mathcal{AMS}$-LaTeX has given a solution to this (place the symbols between parentheses and the accent as an exponent of the right parenthesis), by I happen not to like that solution. For example if I want to write "the interior of $[0,1]$" I prefer to see

$$\overparen{[0,1]}^{\circ}$$

than

$$([0,1])^{\circ}$$

don't you?

And of course this notation is not my invention, I saw it in many French math books (ever heard of Nick Bourbaki?).

\widering I call this macro \widering, because it plays the rôle of a wide symbol (and since the ring can't be widened, a parenthesis is used). Here are some more examples (the first one coded as \ring{A}):

$$\mathring{A}, \widering{AB}, \widering{ABC}, \widering{ABCD}, \widering{ABCDE}, \widering{ABCDEF}, \widering{ABCDEFG},$$

8 The code

1 ⟨*package⟩

We require that the amsmath package is loaded:

2 `\RequirePackage{amsmath}`

First of all we have to ask LATEX to use our brand new font for "large symbols"

3 `\DeclareSymbolFont{largesymbols}{OMX}{yhex}{m}{n}`

Next, the four "wide" accents are defined, in a way similar to LATEX and not to 𝒜ℳ𝒮-LATEX, so yhmath must be loaded after amsmath!

4 `\DeclareMathAccent{\widetilde}{\mathord}{largesymbols}{"65}`
5 `\DeclareMathAccent{\widehat}{\mathord}{largesymbols}{"62}`
6 `\DeclareMathAccent{\widetriangle}{\mathord}{largesymbols}{"E6}`
7 `\DeclareMathAccent{\wideparen}{\mathord}{largesymbols}{"F3}`

The amatrix environment is defined

8 `\newenvironment{amatrix}{\left\langle\begin{matrix}}{\end{matrix}\right\rangle}`

And now the \adots macro for anti-diagonal dots. This is just the \ddots command, mirrored

9 `\def\adots{\mathinner{\mkern2mu\raise\p@\hbox{.}`
10 `\mkern2mu\raise4\p@\hbox{.}\mkern1mu`
11 `\raise7\p@\vbox{\kern7\p@\hbox{.}}\mkern1mu}}`

Following the way 𝒜ℳ𝒮-LATEX defines math accents, here is the definition of \ring. family.

12 `\edef\@tempa#1#2{\def#1{\mathaccent\string"\noexpand\accentclass@#2 }}`
13 `\@tempa\ring{017}`

And finally here is a (clumsy) definition of \widering, that is a ring over an horizontal parenthesis.

14 `\newcommand{\widering}[1]{\overset{\smash{\lower1.333ex\hbox{$%`
15 `\displaystyle\ring{}$}}}{\wideparen{#1}}}`

16 ⟨/package⟩

17 ⟨*fdfile⟩

Follows the FD file. Here we define the yhex family, at least for the OMX (Old Math Extensible symbols) encoding

18 `\ProvidesFile{OMXyhex.fd}`
19 `          [1996/01/04 v1.0 YH's humble contribution to TeX maths]`
20 `\DeclareFontFamily{OMX}{yhex}{}{}`
21 `\DeclareFontShape{OMX}{yhex}{m}{n}{`
22 `   <-> sfixed * yhcmex10`
23 `   }{}`
24 ⟨/fdfile⟩

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