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

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Abstract

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

1 Installation

This package consists of (a) a font, written in PostScript, (b) the same font written in Metafont, (c) a LaTeX style file, (d) a FD file for the OMX encoding using the new font, (e) a virtual font that uses cmex font for the lower 128 positions.

In case you obtained the package via one of the distributions, no further steps should be necessary. If you downloaded the files from CTAN, all the files have to be installed into their respective places within the TDS hierarchy.

2 About Changes in v1.1

Yannis first released the Metafont version of the font in 1996, and later added the PostScript version in 2002. These two packages ended up in two different directories on CTAN, creating confusion. In 2013, after a discussion on the TeX Live mailing list, we decided to merge the two packages into one.

We change the direction and generation in this release. The original dtx file created the Metafont source as `yhcmex10.mf`, which was then copied to `yrcmex10.mf`. We changed this to directly generate `yrcmex10.mf`.

Furthermore, the virtual font provided originally by Yannis had a small bug with respect to big delimiters (small empty space in the middle), which was fixed by Akira Kakuto.

Another bug concerning the DeclareFontFamily declaration was reported and fixed by Kazuhiro Okuma.

Norbert Preining merged the various sources, adapted the documentation, and uploaded the new package to CTAN.

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[*]This file is 1.1, last revised 2013/07/04.
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3 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.

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

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

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

5 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:

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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.

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

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

6   New roots

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

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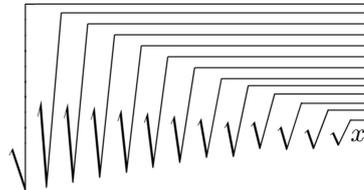
7   A few things missing from $\mathcal{AMS}$-LaTeX v1.2

\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 $\mathring{X} =]0, 1[$.

8   Very wide accents

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

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

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

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? $\widehat{ABC}$ 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

$$\overset{\circ}{\widehat{[0, 1]}}$$

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}`):

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

9   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 $\mathcal{AMS}$-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 $\mathcal{AMS}$-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. We use the virtual font yhcmex10 to make sure that the lower 128 code points are filled, too.

```
18 \ProvidesFile{OMXyhex.fd}
19          [2013/07/03 v1.1 YH's humble contribution to TeX maths (NP)]
20 \DeclareFontFamily{OMX}{yhex}{}
21 \DeclareFontShape{OMX}{yhex}{m}{n}{
22    <-> sfixed * yhcmex10
23    }{}
24 ⟨/fdfile⟩
```