Preserving the math class of variables

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If there is one thing that OpenType math has made clear, it’s that we have lots of alphabets. It is customary in a \TeX document to key in regular (ASCII) letters and expect them to become for instance math italic, bold upright, script or whatever.

One way to do this is to relate a character (directly or by name) to a specific slot in a font assigned to a so-called math family, which groups text, script and scriptscript sizes. Here are a couple ways to do this, using the Unicode \texttt{\charmathcode} primitive:

\begin{verbatim}
\charmathcode'a = "0 "9 'a
\charmathcode'a = "0 "$5 "1D44E
\end{verbatim}

In the first line we map the input character \texttt{a} (the first ‘a) to the glyph slot of \texttt{'a} (the second one; that is, 97) in family 9. In the second line, the input \texttt{a} is mapped to the Unicode math italic alphabet’s \texttt{a}, using family 5. The "0 in both lines is the math class, in this case specifying an “ordinary” character.

Switching families can be done directly, although more usually it is wrapped in a command:

\begin{verbatim}
\$ a + \{\texttt{\charfam}9 a\} + \{\texttt{\charfam}5 a\} \$
\end{verbatim}

For our next example, we take a colon from family zero ("0) and assign it class 6 ("6) which means that it will get punctuation spacing (like \texttt{\Colon}):

\texttt{\charmathchardef\foo "6 "0 ': % punct}

In the following line we do the same but with class 7, which is “variable”, meaning \TeX uses the current family, as stored in the \texttt{\charfam} primitive parameter.

\texttt{\charmathchardef\foo "7 "0 ': % ord}

Doing this, we lose the prior class value (3), so we end up with ordinary (which normally means no) spacing. In Lua\TeX (\texttt{>1.15.1}) we can now preserve the class by declaring and using a special “variable” family instead:

\texttt{\variablefam"24 \charmathchardef\foo "6 "24 123 % punct}

When a character has family \texttt{\variablefam} assigned, it will get the current \texttt{\charfam} value and the class can remain 3, as specified.

This is a relatively cheap extension which we prototyped in LuaMeta\TeX and backported to Lua-\TeX. We don’t use this in Con\TeXt (just to warn its users) but it might be handy in other macro packages.

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