Technical notes on $\mathcal{A}\mathcal{M}\mathcal{S}$-LaTeX version 1.2

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1 Introduction

These notes are miscellaneous remarks on some technical questions that arose during the work on version 1.2 of $\mathcal{A}\mathcal{M}\mathcal{S}$-LaTeX. We expect to add more sections as further questions arise.

2 Why can't I use abbreviations for the `equation` environment?

Many users have discovered to their dismay that when switching from ordinary LaTeX to the `amsmath` package, they are no longer able to use abbreviations such as `\beq \eeq` for `\begin{equation} \end{equation}`. This has to do with unfortunately nontrivial technical complications: the environments such as `align` must read their contents as a delimited macro argument because they do multipass processing of the contents using algorithms inherited from Spivak's `amstex.tex`. The obvious solution—substitution of different algorithms that do box shuffling instead of token shuffling for the multipass calculations—would require rewriting these display environments from the ground up; while that is a worthy goal, it was beyond the original scope of the $\mathcal{A}\mathcal{M}\mathcal{S}$-LaTeX project. Some progress has in fact been made on such a solution [time of writing: January 1995], but not yet to the point of being ready for release.

3 The `upref` package

The reason for splitting out the `upref` package instead of automatically incorporating it in the `amsart` and `amsbook` classes is this: It involves low-level surgery on an important LaTeX command. This means that if ever this command changes in the future (as it did between versions 2.09 and 2e of LaTeX) we have a maintenance problem. And the benefit that `upref` provides is something that most users don't care much about. It can be used for in-house AMS production but it need not be inflicted on all users. Instead we leave the choice to the individual user.

4 The `amsintx` package

The `amsintx` package is still in the experimental stage. The variety of notation for integrals and sums is so great it's difficult to pick one's way through all the complications.

5 Deprecated and disallowed commands

Certain commands were moved out of `amstex` into `amsxtra` because they seemed to be little-used relics: `\accentedsymbol`, 'sup accents' (`\sptilde`, `\sphat`, etc.). The primitive commands `\over`, `\atop`, `\above` were disallowed by the `amsmath` package when it superseded `amstex` (see below).

6 Hyphenation in the documentation

Hyphenation was allowed for certain long command names in `amsldoc.tex`; this presented technical difficulties because LaTeX normally deactivates hyphenation for tt fonts. The method chosen to reinstate hyphenation was to turn off the encoding-specific function `\OT1+cmtt` that disables the `\hyphenchar` for tt fonts; see the definition of `\allowtthyphens` in `amsdtx.dtx`. Then a list of all tt words in the document was gathered (from the `.idx` file, produced by the `\cn`, `\fn`, `\pkg`, etc. commands) and `\showhyphens` was applied to this list. The result was another list in the resulting TeX log, containing those words in a form suitable for the argument of `\hyphenation`. That list was then edited by hand to overrule undesirable hyphenations; words with acceptable hyphenations were dropped from the list, as they don't need to be repeated there.

7 Why did `\matrix`, `\pmatrix`, and `\cases` stop working when I added the `amsmath` package?

If you used the `plain.tex` versions of `\matrix`, `\pmatrix`, or `\cases` in a document and then later converted the document to use the `amsmath` package (or one of the AMS documentclasses, which automatically call the `amsmath` package internally), the instances of those commands will produce error messages. The problem is that when LaTeX was originally created, it adopted most of its mathematics features straight from `plain.tex`. But in the case of `\matrix`, `\pmatrix`, `\cases` this was a mistake—the `plain.tex` syntax for them is decidedly non-LaTeX in style, for example the fact that they use `\cr` instead of `\\` to mark line breaks, and they don't use `\begin` and `\end`. In basic LaTeX this mistake will be perpetuated at least until LaTeX3 appears, in order to avoid breaking existing documents. But no existing documents that were written with the `amsmath` package have that syntactic problem, as `amsmath` provides proper LaTeX-syntax versions of `\matrix` and the others. The possibility of optionally allowing the `plain.tex` variants to make document conversion easier seems ill-advised since those variants are so blatantly wrong in a LaTeX context.

8 Why did `\over`, `\atop`, `\above` [`...withdelims`] stop working when I added the `amsmath` package?

The six generalized fraction commands `\over`, `\overwithdelims`, `\atop`, `\atopwithdelims`, `\above`, `\abovewithdelims` are expressly forbidden by the `amsmath` package; use of the recommended forms `\frac` (and variants) is now required, instead of merely recommended. (I tend to construe LaTeX's provision of `\frac`, and the lack of any mention in the LaTeX book of the primitive fraction commands, as an implicit injunction against their use, although I don't think Lamport actually spent a lot of time pondering the issue, and the basic LaTeX version of `\frac` provides access only to `\over`, not to `\atop`, `\above`, or the **`withdelims`** variants.)

Not only is the unusual syntax of the TeX primitives rather out of place in LaTeX, but furthermore that syntax seems to be responsible for one of the most significant flaws in TeX's mathematical typesetting capabilities: the fact that the current mathstyle at any given point in a math formula cannot be determined until the end of the formula, because of the possibility that a following generalized fraction command will change the mathstyle of the *preceding* material. To cite two of the worst side effects: `\mathchoice` must actually typeset all four of its arguments, instead of being able to immediately select only one; and, were it possible to always know the current math style at a given point, math font selection would be greatly simplified and the upper limit of 16 different math font `\fam`s would never be a problem as `\text,script[script]font` assignments for any `\fam` could take immediate effect and therefore could be changed arbitrarily often within a single formula. More concretely, math font selection difficulties are responsible for many of the more convoluted passages in the source code of LaTeX's NFSS (that does font loading on demand) and of the `amsmath` package, and by extension it has historically been responsible for significant delays in making new features available to end users and for making those features more prone to bugs.

There are additional bad consequences following from the syntax of those generalized fraction commands that only become evident when you do some writing of nontrivial macros for math use. For example, as things currently stand you cannot measure the size of any object in math without going through `\mathchoice` and *leaving and reentering math mode* via `\hbox{$` (which then introduces complications regarding `\everymath` and `\mathsurround`). And it seems that uncertainty about the current mathstyle is the only barrier to allowing the use of mu units with `\vrule`, to make vertical struts in constructing compound symbols or notation. And so on and so forth.