Extending TeX's mathematical typography

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1 Introduction

One of the reasons why TeX is still in use is that its abilities in setting mathematical formulas are still unsurmounted. But there are some nits to pick.

I propose a small set of extensions to TeX to remove some deficiencies in its handling of formulas.

2 Implementation

The implementation is split into a series of change files:

`accent.ch` implements three new primitives for nestable accents and under accents. To some extent these can be implemented in TeX itself (see $\mathcal{AMS}$-LaTeX), but macro solutions are complicated, slow and error-prone.

`\mathaccent`⟨*15-bit number*⟩⟨*math field*⟩ can now grok an extensible recipe at the end of a charlist. The extensible recipe is used to construct longer variants of an accent (in analogy to growing delimiters).

`\nestingmathaccent`⟨*15-bit number*⟩⟨*math field*⟩ is like `\mathaccent`, but it follows a chain of `\nestingmathaccent` or `\nestingmathunderaccent` primitives to determine its accentee and the appropriate skew.

`\mathunderaccent`⟨*15-bit number*⟩⟨*math field*⟩ places an accent *under* the ⟨*math field*⟩. It uses the ⟨*accent*⟩–⟨*accent*⟩ kerning to determine the vertical space between the ⟨*math field*⟩ and the ⟨*accent*⟩ and the ⟨*skewchar*⟩–⟨*accentee*⟩ kerning to determine the appropriate skew to the left.

`\nestingmathunderaccent`⟨*15-bit number*⟩⟨*math field*⟩ is a variant of `\mathunderaccent` which respects the nesting of accents.

`cramp.ch` complements the `\displaystyle`, ..., `\scriptscriptstyle` style-changing primitives by `\crampeddisplaystyle`, ..., `\crampedscriptscriptstyle` which change to the cramped styles.

`fraction.ch` continues to improve the math style-handling. It adds the following:

`\mathstyle` is a special readonly integer parameter corresponding to the current math style according to the following table:

math style	`\mathstyle`
none	< 0
D	0
D'	1
T	2
T'	3
S	4
S'	5
SS	6
SS'	7

`\fraction{`⟨*math field*⟩`}` can be used to surround fractions. Its sole purpose is that `\mathstyle` reports the correct values in a subformula like `\fraction{...\over...}` while it fails to do so in `{...\over...}`.

`radical.ch` implements the following new primitive:

`\genradical`⟨*27-bit number*⟩⟨*27-bit number*⟩⟨*math field*⟩ creates a radical with delimiters on both sides. By specifiying a nonexisting left delimiter, you can also create a right radical.

3 Installation

The change files are written for TeX 3.1459. But it should need only cosmetic changes to get them to work with other versions of TeX3.

To make the change files for TeX work, you have to apply the change file `pre.ch` first. I have only tried these files with `web2c`, and for that you need to surround the `web2c` change file with `pre-web2c.ch` and `post-web2c.ch`.

All this boils down to the command line

```
mv tex.ch tex.ch.orig
tie -c tex.ch tex.web pre.ch accent.ch \
     cramp.ch fraction.ch radical.ch \
     pre-web2c.ch tex.ch.orig \
     post-web2c.ch
```

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