

A Silly Little GELLMU Article

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This is the simplest possible type of article. Its body consists of just a few paragraphs. It is a GELLMU document. GELLMU stands for “Generalized Extensible L^AT_EX-Like Markup”.

GELLMU is designed to admit **completely** automated translation into many document languages. Classical L^AT_EX does not have that property; but some L^AT_EX documents do when imported under GELLMU. Yet GELLMU is really no more difficult to edit than L^AT_EX.

It is relatively easy for a sophisticated GELLMU user with freely available software to add L^AT_EX-like commands to GELLMU.

There is no organization of this article into sections. The *content model* for this type of document (GELLMU “article”) provides that the document body be organized either into one or more sections, which may be preceded and followed by paragraphs outside those sections, or that the document body simply be organized into *one* or more paragraphs.

One thing to notice is that the generalized L^AT_EX markup allows new paragraphs to be opened with the appearance of a blank line in the marked up document.

Another thing to notice is that

```
"\begin{par} ... \end{par}"
```

and

```
"\par{ ... }"
```

are essentially equivalent forms of markup in GELLMU. That is, GELLMU markup, which is essentially a markup under SGML does not provide its own concept of “environment” although it supports L^AT_EX-like environmental markup.

Just as with T_EX or L^AT_EX it is easy to provide a mathematical formula, such as $y = x^3/(x^2+1)$, either inline or displayed.

This paragraph contains a math display involving the same formula:

$$y = \frac{x^3}{x^2 + 1} .$$

Here is a gratuitous inline radical: $\sqrt[3]{2}$.

The current version of the didactic GELLMU “article” definition supports simple mathematical commands such as “**frac**”, “**sum**”, “**int**”, and “**prod**”, and provides some “**table**” support. Table models are close adaptations of the early HTML table model, and there is near emulation of L^AT_EX’s “**tabular**” model.

The square root of a compound fraction:

$$\sqrt{\frac{\frac{a}{b}}{\frac{c}{d}}} .$$

This math display was marked up with:

```
\[ \sqrt{\frac{\frac{a}{b}}{\frac{c}{d}}} \] \ \ \eos \]
```

The markup *eos* for “end-of-sentence” is used instead of ‘.’ in order to signal a semantic parser that it is not part of the mathematical content of the display.

Next we present the formula for solving the general quadratic equation:

$$ax^2 + bx + c = 0 .$$

Its solution is marked up with:

```
\[ x = \frac{-b \pm \sqrt{b^2 - 4 a c}}{2 a} \eos \]
```

to give

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} .$$

And we offer the Taylor series of the *exponential* function:

$$e^t = \sum_{k=0}^{\infty} \frac{t^k}{k!} ,$$

which is created with the markup:

```
\[ e^t = \sum_{k=0}^{\infty} \frac{t^k}{k!} \] \ \ \cma \]
```

To be sure that “frac” is working recursively, we try

```
\[\frac{1 + \sqrt{5}}{2} = 1 + \frac{1}{1 + \frac{1}{1 + \frac{1}{1 + \dots}}}\] \eos \]
```

for the continued fraction expansion of the *golden mean*, and this yields:

$$\frac{1 + \sqrt{5}}{2} = 1 + \frac{1}{1 + \frac{1}{1 + \frac{1}{1 + \dots}}} .$$

It is important to understand what is or is not happening here. The mathematical markup is rather \LaTeX -like. In fact, only the markup for “\sum” is slightly different from the mathematical markup used with \LaTeX . That is because it is essential in GELLMU to have a precise location for the end of that which is being summed¹.

¹The reason is that the exact end location for “\sum” is not deducible merely from the *syntax* of its markup but requires a knowledge of the command name *sum*. This is always the case for a command with more than one argument. For some such commands it is inconsequential because the location of the end is determined automatically at the second stage of processing with sufficient precision. Where greater precision is needed, however, it must be provided in input markup since the first stage of processing is allowed to know only syntax.

One way for a mathematician to view the difference between GELLMU, \LaTeX and HTML is to think about “rational maps of algebraic surfaces”. If one wishes to have an automatic translator from \LaTeX to HTML (or even to HTML with provision for mathematical notation), there will be places where the transformation is singular and fails. Such singularities may be resolved by moving to a markup designed to “dominate” both targets.

I never intend to provide more than a *didactic* definition of “article” inasmuch as it is my opinion that each author or work group of authors will ultimately find it essential, just as now they find essential the `\newcommand` feature of \LaTeX , to be able to provide customization. *Customization* is ever so much more important in GELLMU than in \LaTeX because under this design there will never be a full set of ultimate target formats. With \LaTeX customization is primarily a matter of authoring convenience; under GELLMU customization is required in order to be able to service all of the desired target formats.

Beyond that an author or work group may hope to design a definition of “article” (or of another document type) that is robust for almost any *conceivable* target format by thinking carefully about all possible “content” distinctions relevant to his, her, or its current authoring context. To the extent that this design meets that goal, the author or work group will have no need to revisit old documents in order to be able to have automatic processing to new formats.

Document network address for HTML:
<http://www.albany.edu/~hammond/gellmu/>