Sample Halloween Math

A. U. Thor

January 6, 2017

A reduction my students are likely to make:

$$\mathwitch \frac{\sin x}{s} = x\,\mathrm{in}$$

The same reduction as an in-line formula: $\mathwitch \frac{\sin x}{s} = x\,\mathrm{in}$.

Now with limits:

$$\mathwitch_{i=1}^{n} \frac{i\text{-th magic term}}{2^{i}\text{-th wizardry}}$$

And repeated in-line: $\mathwitch_{i=1}^{n} x_i y_i$.

The bold math version is honored:

$$\mathwitch* \left\langle \begin{matrix} \textbf{something terribly} \\ \textbf{complicated} \end{matrix} \right\rangle = \mathbf{0}$$

Compare it with `normal` math:

$$\mathwitch* \left\langle \begin{matrix} \text{something terribly} \\ \text{complicated} \end{matrix} \right\rangle = 0$$

In-line math comparison: $\boldsymbol{\mathwitch* f(x)}$ versus $\mathwitch* f(x)$.

There is also a left-facing witch:

$$\reversemathwitch \frac{\sin x}{s} = x\,\mathrm{in}$$

And here is the in-line version: $\reversemathwitch \frac{\sin x}{s} = x\,\mathrm{in}$.

Test for `\dots`:

$$\mathwitch_{i_1=1}^{n_1} \cdots \mathwitch_{i_p=1}^{n_p} \frac{i_1\text{-th magic factor}}{2^{i_1}\text{-th wizardry}} \mathpumpkin \cdots \mathpumpkin \frac{i_p\text{-th magic factor}}{2^{i_p}\text{-th wizardry}}$$

And repeated in-line: $\mathwitch \cdots \mathwitch_{i=1}^{n} x_i y_i$.

Now the pumpkins. First the `bold` math version::

$$\boldsymbol{\bigoplus_{h=1}^{m} \bigpumpkin_{k=1}^{n} P_{h,k}}$$

Then the `normal` one:

$$\bigoplus_{h=1}^{m} \bigpumpkin_{k=1}^{n} P_{h,k}$$

In-line math comparison: $\boldsymbol{\bigpumpkin_{i=1}^{n} P_i \neq \bigoplus_{i=1}^{n} P_i}$ versus $\bigpumpkin_{i=1}^{n} P_i \neq \bigoplus_{i=1}^{n} P_i$.

Close test: $\bigoplus\bigoplus$. And against the pumpkins: $\bigpumpkin\bigpumpkin\bigoplus\bigoplus$.

In-line, but with `\limits`: $\bigoplus\limits_{h=1}^{m} \bigpumpkin\limits_{k=1}^{n} P_{h,k}$.

Binary: $x \pumpkin y \neq x \oplus y$. And in display:

$$a \pumpkin \frac{x \pumpkin y}{x \oplus y} \otimes b$$

Close test: $\oplus\oplus$. And with the pumpkins too: $\pumpkin\pumpkin\oplus\oplus$.

In general,

$$\bigpumpkin_{i=1}^{n} P_i = P_1 \pumpkin \cdots \pumpkin P_n$$

The same in bold:

$$\boldsymbol{\bigpumpkin_{i=1}^{n} P_i = P_1 \pumpkin \cdots \pumpkin P_n}$$

Other styles: $\frac{x \pumpkin y}{2}$, exponent $Z^{\pumpkin}$, subscript $W_{x \pumpkin y}$, double script $2^{t_{x \pumpkin y}}$.

Clouds. A hypothetical identity: $\frac{\sin^2 x + \cos^2 x}{\cos^2 x} = \mathcloud$. Now the same identity set in display:

$$\frac{\sin^2 x + \cos^2 x}{\cos^2 x} = \mathcloud$$

Now in smaller size: $\frac{\sin x + \cos x}{\mathcloud} = 1$.

Specular clouds, `bold`...

$$\boldsymbol{\mathcloud \longleftrightarrow \reversemathcloud}$$

...and in `normal` math.

$$\mathcloud \longleftrightarrow \reversemathcloud$$

In-line math comparison: $\boldsymbol{\mathcloud \leftrightarrow \reversemathcloud}$ versus $\mathcloud \leftrightarrow \reversemathcloud$. Abutting: $\boldsymbol{\mathcloud}\mathcloud$.

Ghosts: 👻👻👻👻👻👻👻. Now with letters: H👻H👻h👻ab👻f👻wxy👻, and also $2👻^3 + 5👻^2 - 3👻_i = 12👻_j^4$. Then, what about $x^{2👻}$ and $z_{👻+1} = z_{👻}^2 + z_{👻}$?

In subscripts:

$$F_{👻+2} = F_{👻+1} + F_{👻}$$
$$F_{👻+2} = F_{👻+1} + F_{👻}$$

Another test: 👻|👻|👻|👻|👻|👻|👻|👻|👻. We should also try this: 👻👻👻👻.

Extensible arrows:

$$A \xrightarrow[a\star f(t)]{x_1+\cdots+x_n} B \xrightarrow{x+z} C \xrightarrow{} D$$
$$A \xrightarrow[a\star f(t)]{x_1+\cdots+x_n} B \xrightarrow{x+z} C \xrightarrow{} D$$
$$A \xleftarrow[a\star f(t)]{x_1+\cdots+x_n} B \xleftarrow{x+z} C \xleftarrow{} D$$
$$A \xleftarrow[a\star f(t)]{x_1+\cdots+x_n} B \xleftarrow{x+z} C \xleftarrow{} D$$

And $\overrightarrow{x_1 + \cdots + x_n} = 0$ versus $\overrightarrow{x_1 + \cdots + x_n} = 0$; or $\overleftarrow{x_1 + \cdots + x_n} = 0$ versus $\overleftarrow{x_1 + \cdots + x_n} = 0$.

Hovering ghosts: $\overline{x_1 + \cdots + x_n} = 0$. You might wonder whether there is enough space left for the swishing ghost; let's try again: $\overline{(x_1 + \cdots + x_n)y} = 0$. As you can see, there is enough room. Lorem ipsum dolor sit amet consectetur adipisci elit. And 👻 too.

$$A \xrightarrow[a\star f(t)]{x_1+\cdots+x_n} B \xrightarrow{x+z} C \xrightarrow{} D$$
$$A \xleftarrow[a\star f(t)]{x_1+\cdots+x_n} B \xleftarrow{x+z} C \xleftarrow{} D$$

Another hovering ghost: $\overline{x_1 + \cdots + x_n} = 0$.. Lorem ipsum dolor sit amet consectetur adipisci elit. Ulla rutrum, vel sivi sit anismus oret, rubi sitiunt silvae. Let's see how it looks like when the ghost hovers on a taller formula, as in $\overline{H_1 \oplus \cdots \oplus H_k}$. Mmmh, it's suboptimal, to say the least.[1]

Under "arrow-like" symbols: $\underline{x_1 + \cdots + x_n} = 0$ and $\underline{x + y + z}$. There are $\underline{x_1 + \cdots + x_n} = 0$ and $\underline{x + y + z}$ as well.

[1] We'd better try $\underline{y_1 + \cdots + y_n}$, too; well, this one looks good!

A comparison between the "standard" and the "script-style" over/under extensible arrows:

$$\overrightarrow{f_1 + \cdots + f_n} \neq \overrightarrow{f_1 + \cdots + f_n}$$
$$\overleftarrow{f_1 + \cdots + f_n} \neq \overleftarrow{f_1 + \cdots + f_n}$$
$$\overleftrightarrow{f_1 + \cdots + f_n} \neq \overleftrightarrow{f_1 + \cdots + f_n}$$
$$\underrightarrow{f_1 + \cdots + f_n} \neq \underrightarrow{f_1 + \cdots + f_n}$$
$$\underleftarrow{f_1 + \cdots + f_n} \neq \underleftarrow{f_1 + \cdots + f_n}$$
$$\underleftrightarrow{f_1 + \cdots + f_n} \neq \underleftrightarrow{f_1 + \cdots + f_n}$$