Simple example

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1 Hello

This is a simple example using the H$_A$T$_E$X library and some math stuff.

1.1 Arithmetics with infix operators

$$4^{\left(2^3\right)^2} - 10000 \cdot 10000 \cdot (10000 \cdot 10000) \cdot (10000 \cdot 10000 \cdot 10000)$$

is $3.40282 \cdot 10^{38}$. For $x = 19$ and $\tau = 2 \cdot \pi$,

$$2 + 7 \cdot (6 - \tau) - e^{5 - \sqrt{x^2 + \frac{4}{\pi}}} \approx 1.7702 \cdot 10^{-2}.$$

1.2 Simple finite sums

$$\sum_{n \in \{0,1,4,5\}} \tfrac{5}{2} - n = 0$$

$$\sum_{n=1}^{4} \tfrac{5}{2} - n = 0$$

$$\sum_{j=1}^{40} \cos\left(\frac{2 \cdot \pi}{40} \cdot j\right) \approx -2.6645 \cdot 10^{-15}$$

$$2 \cdot \sum_{i=1}^{6} i^2 + i = 224$$

$$\left(\sum_{i=1}^{6} i^2 + i\right) \cdot 2 = 224$$

$$\left(\sum_{i=1}^{6} i^2 + i\right) + 2 = 114$$

$$\sum_{i=1}^{6}\sum_{j=1}^{6} i \cdot j = 441$$

1.3 Checking some simple identities

$$\arcsin\left(\sin\left(\arccos\left(\cos\left(\arctan\left(\tan 0\right)\right)\right)\right)\right)$$

is 0,

$$\operatorname{arcsinh}\left(\sinh\left(\operatorname{arccosh}\left(\frac{\cosh\left(\operatorname{arctanh}(\tanh 0)\right)}{2}\right)\right)\right)$$

is not. (Test passed.)

A simple equations chain:

$$10^{18} = 10^9 \cdot 10^9$$
$$= 10^{3^2} \cdot 10^5 \cdot 10^4$$
$$= 1000000000000000000.$$

(Test passed.)

Another equations chain, this time using floats:

$$10^{-18} = 10^{-9} \cdot 10^{-9}$$
$$= 10^{-\left(3^2\right)} \cdot 10^{-5} \cdot 10^{-4}$$
$$= \frac{1}{1000000000000000000}.$$

Test failed. Even true mathematical identities may not show to hold when using floating-point arithmetics.

Equation-chains can also be approximate ("rough"):

$$10^{-18} \approx 10^{-9} \cdot 10^{-9}$$
$$\approx 10^{-\left(3^2\right)} \cdot 10^{-5} \cdot 10^{-4}$$
$$\approx \frac{1}{999236372934876337}.$$

(Test passed.)