

The Notation of Mathematics

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April 18, 2008

Mathematicians have always invented notation. It was easier when manuscripts were handwritten. Printing introduced a new player; the typesetter. Finally Donald Knuth returned notation to the exclusive hands of authors with $\text{L}^{\text{A}}\text{T}_{\text{E}}\text{X}$.

Some examples, like $\sum_{i=1, \infty} (1/n)$ and $\sqrt{2}$

have made all the way into Microsoft Powerpoint.

The dominant motivations are

1. What is frequent should be brief
2. Supporting transformations that maintain correctness

The formula $e^{i\pi} + 1 = 0$ contains single-glyph representations for the base of natural logarithms, the ratio the diameter of a circle to its circumference, and the square root of -1.

$$(231+4502)+99 = (4502+99)+231$$

are two different computations (when done by hand) but we do not need to check equality because commutivity and associativity rules

$$x+y=y+x \text{ and } (x+y)+z=x+(y+z)$$

Allow us to change one side of the formula into the other without ever having to do an addition.

And so it goes in mathematics....