WYSIWYG and WYSIWYM

- KaTeX and WeTeX
- Backslash macros
- Menu and Macro Objects
- Functions and keyboard short-cuts

Content vs Form

- Computable math (content MathML)
- Presentation math (LaTeX)
- Can we do both?

Contradictions in real life

- Left & Right symmetry
- Spherical symmetry of earth
- Electrical and Nuclear forces – David and Goliath

Classical logic and the blow-up

- A and -A true ==> B is true (blow-up)
- Paraconsistency logic

Finite and Infinity

- Zeno’s paradox
- Number of points in (0,1) is infinite, but it is of finite length (= 1)
- Countable infinity, rational numbers
- Real numbers are uncountable
- Cantor set
- Transcendental numbers

Uncountability of Real numbers

$a_i \in (0,1)$:

a_1 = 0.0100100001000....

a_2 = 0.0101001010 1....

a_3 = 0.1001001010 11....

....

Cantor diagonilization:

b = 0.101....

$b \notin \{a_1, a_2, a_3, \ldots\}$

$C = 2^{\mathscr{H}}$

- $x = 0.010101001110 \ldots$
- X = {2,4,6,9,10,11,...}
- F: x --> X
- F is a bijective mapping from (0,1) to $2^{\mathscr{H}}$
- Hierarchy of infinities: $\mathscr{H}$, $2^{\mathscr{H}}$, $2^{2^{\wedge}\{\mathscr{H}\}}$, ...

Classical Hegelian contradictions

- Contradiction, synthesis and hierarchy
- Finite and Infinite
- Hierarchcy of infinities

Scaling dimension and Cantor set

- Keep removing middle one-third iteratively
- $3^n = 2$
- Scaling dimension of cantor set
- n = log2 / log3
- $0 < n < 1$
- Uncountable since it {0,2} instances of a tredecimal representaion of (0,1)
- 0.02002022002... (uncountable)

Complexity and Solvability

- Algoritms <==> Natural numbers
- Decision problems f: N --> {0,1} (binary real number)
- Algorithms are countable (Turing number)
- Decision problems uncountable
- Rational numbers are dense in Real numbers (contradiction)

Complexity and Solvability

- Algebraic irrationals (solutions of polynomials with rational co-effecients).
- Yes, there is an infinity between $\mathscr{H}$ and $2^{\mathscr{H}}$
- NP = P? No!
- Second-order phase transitions
- Iterative functions and Neural networks
- Unreasonable effectiveness of Neural networks
- Transcendental numbers and NP-hard problems