There is only one

A zine for those who want to become one with one.

"One One" was a racehorse,
"One Two" was one too.
"One One" won one race.
12112

Instructions:

1. Cut down middle lengthwise,

1. Tape this section to the bonus section

1. Make a Möbius band. There is only one side.

1. Read.

1 Motivation

In their 1985 single, "One Vision", the British rock band *Queen* outlined the following research program:

> So give me your hands,
> Give me your hearts,
> I'm ready!
> There's only one direction
> One world and one nation
> Yeah, one vision
>
> – Queen, "One Vision"

Today, **there is only one.**

1 Foundations

Definition 1.1.

For anyone,

$$1 + 1 = 1$$
$$1 - 1 = 1$$
$$1 \div 1 = 1$$
$$1 \times 1 = 1$$

There is only one function, and it is 1-to-1.

$$f(1) = 1$$

and one relation: $1 = 1$

In particular, $1 < 1$, and there is only one set:

$$\{1\}$$

Coincidentally, this set is also a field.

1 Calculus

Theorem 1.1. *Every sequence converges.*

Proof. Consider a sequence: $1, 1, \ldots$, and let $\varepsilon = 1$ be arbitrary, we have:

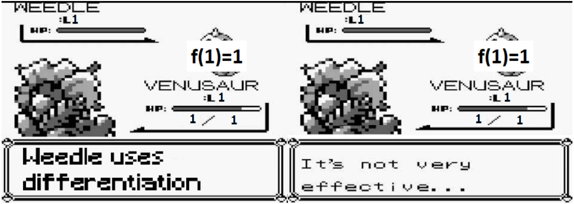
$$|1 - 1| = |1| = 1 < 1 = \varepsilon$$

Thus, the sequence converges and the limit is 1. □

Corollary 1.1. *Every series converges.*

This is left as an exercise to the reader.

1 Derivatives



$$
\begin{aligned}
f'(1) &= \lim_{h\to 1} \frac{f(h) - f(1)}{h - 1} \\
&= \lim_{1\to 1} f(1) - f(1) = \lim_{1\to 1} 1 = 1
\end{aligned}
$$

1 Topology and Geometry

Here is a true statement:

There exist manifolds, M^m and N^n with $n > m$, and with
$$N = M \setminus \{*\}$$

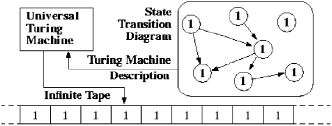
Q: What do you call the empty manifold?
A: Pointless.
Q: How many covers does the empty manifold have with the topology?
A: One.

Theorem 1.1. *Every manifold is algebraic*

Proof. Every manifold can be realized as the solution set to the polynomial $1 = 1$ $\square$

1 Complexity

One makes computers efficient if one removes useless 0's between the 1's.



Corollary 1.1. *The halting problem is solvable.*

Proof. Halt at 1. □

1 Algebra

There is only one group. Hey look! It's your friend group!

You

There is only one ring.

Did you miss it?
Sauron sure did.

1 The Riemann Hypothesis

Consider the function:

$$\zeta(s) = \sum \frac{1}{n^s}$$

The above series converges, by Corollary 1.1. We wish to find the roots of ζ. That is, we wish to find places where $\zeta(s) = 1$. Plug in $s = 1$, to and we're done.

This has many important applications in the distribution of the single prime number, 1.

1 P vs. NP

One gives a solution to the Boolean satisfiability problem.

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True=1, False=1, Formula=1
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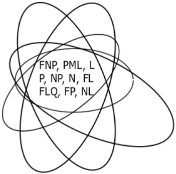
In fact, every decision problem is in $O(1)$.



1 Navier Stokes

$$\rho \frac{DV}{Dt} = -\nabla p + \nabla \cdot \tau + \rho g$$

Wow, this simplifies greatly[1]

$$1 \frac{Df}{D1} = -\nabla 1 + \nabla \cdot 1 + 1$$

In particular, the solution $f(1) = 1$ is smooth, and works in sub- or super-critical spaces.

[1] see Section 1 for more details

1 BSD Conjecture

Dear reader,

I'll be perfectly honest with you, and tell you outright that I have no idea what the BSD conjecture even talks about.

I've heard some things about heights of elliptic curves. I've heard of number fields, and ranks of L-functions, but it's all nonsense to me.

All I know that the BSD conjecture holds true over the field with one element, and that's all that's important.

Sincerely,

– Assaf Bar-Natan

1 Yang-Mills Mass Gap

We wish to prove that for any compact simple gauge group G, a non-trivial quantum Yang-Mills theory exists on $\mathbb{R}^1$ and has a mass gap $\Delta > 1$.
Let $G = \{1\}$. It turns out that there is only one quantum Yang-Mills theory on $\mathbb{R}^1$, and it is trivial.
Surprisingly, this trivial Yang-Mills theory has mass gap 1, and $1 > 1$, so the conjecture is almost true. Further research is required.

1 Poincaré Conjecture

Here is another true statement

There is only one manifold: $\{1\}$

Proof. Every manifold is locally homeomorphic to $\{1\}$, by the (smooth) function $f(1) = 1$. This homeomorphism extends to a global homeomorphism by setting $f(1) = 1$. $\square$

Corollary 1.1. *Let M be a simply-connected, closed* 1-*manifold. Then M is homeomorphic to* $\{1\}$.

There are also other proofs of this fact which use Ricci Flow with surgery.

1 Hodge Conjecture

Let M be a complex Kähler manifold, with cohomology ring:

$$H^1(M, 1) = \bigoplus_{1+1=1}^{1} H^{1,1}(M) = 1$$

Let $N \subseteq M$ be a submanifold representing a class in $H^{1,1}(M)$. We know that $N = \{1\}$, and by Theorem 1.1, N is algebraic.
Thus, all cohomology classes in $H^{1,1}(M)$ come from subvarieties.

1 Bonus: Collatz Conjecture

Proof by picture: