Quantifiers

Definition

$\lim_{x \to a} f(x) = L$ if (and only if) for every number $\epsilon > 0$ there is a number $\delta > 0$ such that

$$0 < |x - a| < \delta \implies |f(x) - L| < \epsilon.$$

What does it mean to say $\lim_{x \to a} f(x) \neq L$?

Definition

The n^{th} Fermat number is

$$F_n = 2^{2^n} + 1$$

(for $n = 0, 1, 2, \ldots$).

- $F_0 = 3$
- $F_1 = 5$
- $F_2 = 17$
- $F_3 = 257$
- $F_4 = 65537$

Conjecture (Fermat 1640)

F_n is always prime.

Translations (Eng to Math)

1. π is not the root of any polynomial.
2. For any number r, if $x^r = 1$, then $|x| = 1$.
3. Bertrand's postulate: There's always a prime between n and $2n$.

Translations (Math to Eng)

1. $\forall M \in \mathbb{N},\ \exists x \in P,\ x > M$ (where P is the set of prime numbers)

2. $\exists X \in \mathcal{P}(\mathbb{N}),\ \forall Y \in \mathcal{P}(\mathbb{N}),\ Y \subseteq X$

3. $\forall x_1, x_2 \in \mathbb{R},\ \exists y \in \mathbb{R},\ \Big[|x_1 - y| = |x_2 - y| \wedge \big(\forall z \in \mathbb{R},\ |x_1 - z| = |x_2 - z| \implies z = y\big)\Big]$