THE INFINITY OF TWIN PRIMES

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DEFINITION 1

$6x \pm 1$ are twin primes where $x = 6nm \pm (n \pm m)$ has no solution for positive integers x, n, and m.

DEFINITION 2

Given n and m are interchangeable,

all solutions for x are $x \, mod(6n \pm 1) \pm n = 0 \;\equiv\; (x \pm n) \, mod(6n \pm 1) = 0$, for all $n \leq \sqrt{\frac{x}{6}}$.

There are four results for each $x, n :$ $(x \pm n) \, mod(6n \pm 1)$.

DEFINITION 3

The distribution of x values with no solution is bounded by

$$D(x) \geq x \prod_{n=1}^{\left\lfloor \sqrt{\frac{x}{6}} \right\rfloor} \frac{6n-3}{6n+1}$$

such that $0 < \frac{D(x)}{x} \leq 1$ for all x.

DEFINITION 4

The average distribution of x values with no solution in a range defined by $6(n-1)^2 \leq x \leq 6n^2$, where $n > 1$, grows by a minimum rate of

$$\left[\frac{6(2n-1)}{6(2(n-1)-1)} \times \frac{6n-3}{6n+1}\right] > 1$$

$\therefore$ there will tend to exist more x values with no solution in subsequent ranges of $\langle x \rangle$, where $|\langle x \rangle| = 6(2n-1)$ and $6(n-1)^2 \leq x \leq 6n^2$, as n increases.

$\therefore$ there will exist twin primes to infinity.