

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

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

DEFINITION 3

The distribution of x values with no solution is bounded by

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

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

DEFINITION 4

$\therefore \left[6(2n-1) \times \prod_1^n \frac{6n-3}{6n+1} \right] > 1$ for all n ,

and \therefore Definitions 1, 2, and 3,

\therefore for any range $\langle x \rangle$ where $|\langle x \rangle| = 6(2n-1)$ and $6(n+1)^2 \geq x \geq 6n^2$ there will exist at least one x with no solution per Definition 1,

\therefore there will exist twin primes to infinity.

Dedicated to Kelly and Jean Dise and Virginie Henry.