There Is No Largest Prime Number

With an introduction to a new proof technique

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Outline

Proof That There Is No Largest Prime Number

A proof using *reductio ad absurdum*.

Theorem

There is no largest prime number.

Proof.

1. Suppose p were the largest prime number.
2. Let $q := 1 + \prod_{i=1}^{p} i = 1 + p!$.
3. Then q is not divisible by any $p' \in \{1, \ldots, p\}$.
4. Thus $q > p$ is also prime. □