infinity prime proof

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I think the next classically well known proof.

Theorem
Prime numbers are infinitely exists.
Proof)
I supose prime numbers are finite.
$p_1, \cdots, p_n$ are these prime numbers.
Then $p_1 \times p_2 \times \cdots p_n + 1$ is not divided by all prime numbers $p_1, \cdots, p_n$.
The numbers of Prime numbers are $n + 1$.This is the contradiction.
Prime numbers are infinitly main.

So,if $2, 3, 5, 7, 11, 13$ is the limited prime numbers,then $2 \times 3 \times 5 \times 7 \times 11 \times 13 + 1 = 30031$ is Prime?
30031 is the conbolution number.

I give next proof.This is instead by before proof.

Theorem
Prime numbers are infinitely exists.
Proof)
I supose prime numbers are finite.
$p_1, \cdots, p_n$ are these prime numbers.
The prime factor of $p_1 \times p_2 \times \cdots p_n + 1$ is not exist in $p_1, \cdots, p_n$
The numbers of Prime numbers are more tha $n + 1$.This is the contradiction.
Prime numbers are infinitly main.

example

Start the case that all prime number of natural number is 3 and $5.3 \times 5 + 1 = 16.16$ is divided $2.2, 3, 5$ is new triple primes.

Well,I use the next definition.

Def(Prime number)
Prime number is divided by themserves or 1.