infinity prime proof

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I think the next cllasically well known proof.

Theorem
Prime numbers are infinitelly 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.