binomial inequality proof of Fermat's Last Theorem

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For all positive integers x, y, and n, the binomial $(x+y)^n$ has the integer root

$$((x+y)^n)^{\frac{1}{n}} = z \in \mathbb{Z}$$

where $x+y=z$.

The expression

$$(x+y)^n \neq x^n + (x+y)^n$$

is an inequality.

As all *integers with an integer root* can be expressed as $((x+y)^n)^{\frac{1}{n}} = z \in \mathbb{Z}$, from the inequality there is *no integer root for the sum of the power products of* $x^n + (x+y)^n$ *for* $n > 2$[1]

$$(x^n + (x+y)^n)^{\frac{1}{n}} \notin \mathbb{Z}$$

This expression is equivalent to Fermat's Last Theorem stating that *no three positive integers x, y, and z satisfy the equation* $x^n + y^n = z^n$ *for any integer value of n greater than two.*

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[1]For n=2, the propositional logic is non-commutative with the inequality which can be re-arranged to $z^2 - x^2 = (x+y)^2$ and $(z+x)(z-x) = (x+y)(x+y)$, the "difference of two squares" form of the Pythagorean theorem, for which there are infinitely many integer triples. Whereas for $n \geq 3$

$$(x+y)^n - x^n \neq (x+y)^n$$

$$(z+x)^n - x^n \neq (x+y)^n$$

the propositional logic is commutative with the inequality.