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A PROOF OF BEAL'S CONJECTURE

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ABSTRACT. It is proved in this paper that the equation $z^{\xi} = x^{\mu} + y^{\nu}$ has no solution in relatively prime positive integers x, y, z, with ξ, μ, ν odd primes at least 3. This is equivalent to Fermat's Last Theorem which is stated as follows: If $x.y, z$ are positive integers, and π is an odd prime satisfying $z^{\pi} = x^{\pi} + y^{\pi}$, then x, y, z are not relatively prime.

(1) (Beal's conjecture) The equation $z^{\xi} = x^{\mu} + y^{\nu}$ has no solution in relatively prime positive integers x, y, z, with ξ, μ, ν primes at least 3.
(2) (Fermat's Last Theorem) If x, y, z are relatively prime positive integers integers and π is an odd prime then $z^{\pi} = x^{\pi} + y^{\pi}$ implies x, y, z are not relatively prime.

The proof of (2) is given in [1], [2], in terms of cyclic groups. It is proved that if x, y, z are positive integers satisfying $z^{\pi} = x^{\pi} + y^{\pi}$ for an odd prime π, then x, y, z are not relatively prime. Thus, it is enough to prove that if $z^{\xi} = x^{\mu} + y^{\nu}$, with positive integers x, y, z, and ξ, μ, ν primes at least 3, then $z^{\xi}, x^{\mu}, y^{\nu}$ and x, y, z are not relatively prime.

Proof. $2 \implies 1$. $\xi \geq \mu \geq \nu \geq 3$.

(Beal's conjecture) The equation $z^{\xi} = x^{\mu} + y^{\nu}$ has no solution in relatively prime positive integers x, y, z, with ξ, μ, ν primes at least 3.

Proof.

$$(z^{\xi})^{\xi} = (x^{\xi})^{\mu} + (y^{\xi})^{\nu} = (x^{\mu})^{\xi} + (y^{\nu})^{\xi},$$

and by Fermat's Last Theorem., $z^{\xi}, x^{\mu}, y^{\nu}$ and x, y, z are not relatively prime. □

$1 \implies 2$. Obvious. □

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