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The Truly Marvellous Proof for n=4

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Ref
1. Guła, L. W.: Disproof the Birch and Swinnerton-Dyer Conjecture – http://pubs.sciepub.com/EDUCATION/4/7/1/index.html

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I. Introduction

The Fermat's Last Theorem is the famous theorem. Here we have the truly marvellous proof for $n=4$.

II. The Truly Marvellous Proof of The Fermat's Last Theorem For N=4

Theorem 1: (FLT for n=4). *The equation*

$$A^4 + B^4 = C^4$$

has no primitive solutions $[A,B,C]$ *in* $\{1,2,3,\ldots\}$.

Proof. Suppose that the $A^4+B^4=C^4$ equation has primitive solutions $[A, B, C]$ in $\{1, 2, 3,\ldots\}$. [1], [2]

Then A, B and C are co-prime. Without loss for this proof we can assume that A is odd. Then B is even and C is odd, which is obviously.

For some C, $A \in \{1,3,5,\ldots\}$ and for some $B \in \{4,6,8,\ldots\}$:

$$(C-A+A)^4 - A^4 = B^4 \Longrightarrow (C-A)^3 + 4(C-A)^2A + 6(C-A)A^2 + 4A^3 = \frac{B^4}{C-A}.$$

Notice that

$$(C-A)^3 + 4(C-A)^2A + 6(C-A)A^2 + 4A^3 = \frac{C^4-A^4}{C-A} = \frac{(C^2+A^2)(C+A)(C-A)}{C-A}.$$

Hence – For some $k \in \{1,2,3,\ldots\}$ and for some e, c, $d \in \{1,3,5,\ldots\}$ such that e, c and d are co-prime:

$$\frac{\left(2^k ecd\right)^4}{C-A} = \frac{\left(2^k ecd\right)^4}{2^{4k-2}d^4} = 4(ec)^4 = \frac{B^4}{C-A}.$$

Therefore – For some relatively prime e, c, $\in \{1,3,5,\ldots\}$ such that e$>c$:

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$$4(ec)^4 = (C^2 + A^2)(C + A) \Longrightarrow (C^2 + A^2 = 2e^4 \wedge C + A = 2c^4) \Longrightarrow$$

$$\begin{aligned}(C = x + y \wedge A = x - y \wedge C + A = 2x = 2c^4 \wedge x = c^4 \wedge x^2 + y^2 = e^4 \wedge x = c^4 \\ = u^2 - v^2 \wedge y = 2uv \wedge e^2 = u^2 + v^2 \wedge e = p^2 + q^2 \wedge u = p^2 - q^2 \wedge v \\ = 2pq) \\ \Longrightarrow \{x^2 = [(p^2 - q^2)^2 - (2pq)^2]^2 = c^8 \equiv \mathbf{0} \wedge y^2 \\ = 4(p^2 - q^2)^2(2pq)^2 \wedge e^4(p^2 + q^2)^4 \wedge [(p^2 - q^2)^2 - (2pq)^2]^2 \\ + 4(p^2 - q^2)^2(2pq)^2 = (p^2 + q^2)^4 \equiv \mathbf{1}\}.\end{aligned}$$

where $(p^2 - q^2)^2 - (2pq)^2 > 4(p^2 - q^2)pq$.

The above last sentence is false inasmuch as on the strength of the Guła's Theorem [1] we have

$$(2pq)^2 = (p^2 - q^2)^2 - (c^2)^2 \Longrightarrow p^2 - q^2 = \frac{(2pq)^2 + (2q^2)^2}{2(2q^2)} = p^2 + q^2 \equiv \mathbf{0}.$$

This is the proof.

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