Crazy Proof of Fermat's Last Theorem

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Abstract

This paper magically shows very interesting and simple proof of Fermat's Last Theorem. The proof identifies sufficient derivations of equations that holds the statement true and describes contradictions on them to satisfy the theorem. If Fermat had proof, his proof is most probably similar to this one. The proof does not require any higher field of mathematics and it can be understood in high school level of mathematics. It uses only modular arithmetic, factorization and some logical statements.

Introduction

Fermat's Last Theorem states that $a^n+b^n = c^n$ has no non-zero integers solution for $n > 2$. It is proposed first by Pierre de Fermat in about 1937, who is amateur of mathematics. Fermat's Last Theorem is a mystery for centuries. Even after the problem is solved by Andrew Wiles in 1994, mathematicians are researching for simple proof while the vast majority of mathematicians believe that no simple proof of FLT exists.
Proof:- The proof is going to be done proof by contradiction.
Let the statement $a^n + b^n = c^n$ has non-zero integer solution for $n > 2$ then it has some derivations of equations that describe the statement. The fact is that, if the derivations are pure and contradict one another then the statement is true.
The statement is broken into two major parts:- They are for the power n, n is the products of 4 and n is the products of odd primes. In both cases the solutions are interrelated in abstract way even though their relation is not our headache.

Case 1:- The power n is the product of 4

In first case the statement $a^n + b^n = c^n$ has no none-zero solution for values of n are the product of 4. in general if the statement is done for certain value of n, then it is done for all values products of n, i.e. for nk k is any natural number. because

$a^{nk} + b^{nk} = c^{nk}$ implies $(a^k)^n + (b^k)^n = (c^k)^n$
we can take a^k as a, b^k as b and c^k as c and it is enough to do for only single term n instead of doing for all its products. like $a^n + b^n = c^n$
the case of fourth power already done by infinity decent method well, even so let us try more. now let $a^4 + b^4 = c^4/$ in primitive quadratic Equation a or b even and similar for fourth power, let a is even
$b^4 = C^4 - a^4$ 1
$b^4 = (c - b)(c + b)(c^2 + b^2)$
The three known factors of b^n have no common factor, therefore
$c - b = p^4$, $c + b = q^4$ and $c^2 + b^2 = r^4$ This implies
$p^8 + q^8 = 2r^4$ 1.1
when we state in quadratic form
$(\frac{q^4-p^4}{2})^2 + (\frac{q^4+p^4}{2})^2 = (r^2)^2$ 1.2
and any primitive quadratic equation represented as:-
$\frac{q^4-p^4}{2} = 2tu + t^2$ 1.3
$\frac{q^4+p^4}{2} = 2tu + 2u^2$ 1.4
$r^2 = 2tu + t^2 + 2u^2$ 1.5
From equations 1.3, 1.4 and 1.5
$q^4 = 4tu + t^2 + 2U^2$ 1.6
$p^4 = 2u^2 - t^2$ 1.7

$r^2 = (t+u)^2 + u^2$ 1.8
From Equation 1.8 in quadratic form
$t + u = 2ef + e^2$ 1.9
$u = 2ef + 2f^2$ 1.10
$r = 2ef + e^2 + 2f^2$ 1.11
From equations 1.9 and 1.10
$t = e^2 - 2f^2$ 1.12
When we substitute and rearrange equations 1.10 and 1.12 on equation 1.7
$p^4 + e^4 = 4f^2(f^2 + 4ef + 3e^2)$ This is impossible because the sum of two fourth power odd numbers is not divisible by 4.

Case 2:- the power n is the product of odd primes

let $a^n + b^n = c^n$ has non zero solutions for n odd primes

Basic concepts on odd prime power of Fermat's Equation Holds

- The sum or difference of two odd powers has two known factors.
- The factors are co-primes unless the power n is not the common factor.
- If the power n divides one factor then n divides the other.
- One of the triplet must be divisible by prime power n.
- No way to restrict which one of the triplet is divisible by power n
- Each of the triplet has the right to be divisible by n alternatively.
- There exist four Equations simultaneously that states single solution of the problem.
- If there exist single solution then there must be three solutions.
- There are twelve Equations simultaneously that states the three solutions and they contradict one another for single value of odd prime n.

for simplicity and to understand different cases well, let, $a < b$ and a is not divisible by n
$a^n = c^n - b^n$ 2.1
$a^n = (c-b)(c^{n-1} + c^{n-2}b + cn - 3b^2.....cb^{n-2} + b^{n-1})$ 2.2
The two known factors of a^n:- $c - b$ and $c^{n-1} + c^{n-2}b + cn - 3b^2.....cb^{n-2} + b^{n-1}$ are co-primes. then
$c - b = p^n$ and $c^{n-1} + c^{n-2}b + cn - 3b^2.....cb^{n-2} + b^{n-1} = q^n$
$q^n - p^{n(n-1)} = ncb(i_0c^{n-3} - i_1c^{n-4}b + i_3c^{n-5}b^2...... - i_1cb^{n-4} + b^{n-3})$
The sequence of i_k is binomial related and $i_k = \binom{n}{k}/n - i_{k-1}$ and it converges back after mid term. This implies
$q^n - p^{n(n-1)}$ is divisible by prime power n. And if the sum/difference of two similar odd prime powers n divisible by their power n, then the sum is divisible at least by the square of the power n.
Hence:- we can conclude that it is must one of the triplets of Fermat's equation is the product of power (n). But which one? can we identify exactly which term is divisible by n? or is it possible randomly to take a is divisible by n? Any how let us start with a, and see what will happen.

Let a_1 divisible by n

$$a_1^n + b_1^n = c_1^n......................................3$$

$$c_1 - b_1 = n^{n-1}p_1^n.............................3.1$$

$$c_1 - a_1 = q_1^n...................................3.2$$

$$a_1 + b_1 = r_1^n...................................3.3$$

$$c_1^{n-1} + c_1^{n-2}b_1 + c_1^{n-3}b_1^2..... + c_1b_1^{n-2} + b_1^{n-1} = nm_1^n...................................3.4$$

$$c_1^{n-1} + c_1^{n-2}a_1 + c_1^{n-3}a_1^2..... + c_1a_1^{n-2} + a_1^{n-1} = l_1^n...................................3.5$$

$$b_1^{n-1} - b_1^{n-2}a_1 + b_1^{n-3}a_1^2..... - b_1a_1^{n-2} + a_1^{n-1} = k_1^n...................................3.6$$

From equations 3.1, 3.2 and 3.3

$$a_1 = \frac{r_1^n - q_1^n + n^{n-1}p_1^n}{2}.............................3.7$$

$$b_1 = \frac{r_1^n + q_1^n - n^{n-1}p_1^n}{2}.............................3.8$$

$$c_1 = \frac{r_1^n + q_1^n + n^{n-1}p_1^n}{2}.............................3.9$$

When we substitute and rearrange eqs 3.7, 3.8, and 3.9 on eqs 3.4, 3.5 and 3.6

$$2^{n-1}k_1^n = r_1^{n(n-1)}... + nq_1^{n(n-1)}... + n^{n^2-2n+2}p_1^{n(n-1)}...................................3.10$$

$$2^{n-1}l_1^n = nr_1^{n(n-1)}... + q_1^{n(n-1)}... + n^{n^2-2n+2}p_1^{n(n-1)}...................................3.11$$

$$2^{n-1}m_1^n = r_1^{n(n-1)}... + q_1^{n(n-1)}... + n^{n(n-2)}p_1^{n(n-1)} ....3.12$$

There is one more equation that can be derived from Fermat's statement. Here even if only one equation can describe Fermat's statement, the existence of alternative equations are must and that leads us to conclude the impossibility of their existence simultaneously. For instance let us consider equations 3.10 and 3.11, it is must $r_1 = q_1$ when we search their first solution. This implies $a_1 + b_1 = c_1 - a_1$ This is impossible because $a + b > c$
There is one more precise contradiction.
Lemma 1 :- If a problem drives a similar equation another problem that has solution already, then the problem has.
Lemma 2 :- If two equations in polynomial form are similar, then they have similar integer solutions
e.g If $z^2 = x^9 + y^5$ has a solution then $v^2 = t^9 + u^5$ has also solution. and
If statement1 drives equation $z^2 = x^9 + y^5$ and has a solution and statement2 can drive an equation $v^2 = t^9 + u^5$ the statement2 exists.
Now it is must b and c to be the product of power n, because they can drive similar equations that have already solution in case of a is divisible by power n.

Let b_2 divisible by n

$$a_2^n + b_2^n = c_2^n ....4$$

$$c_2 - b_2 = p_2^n ....4.1$$

$$c_2 - a_2 = n^{n-1}q_2^n ....4.2$$

$$a_2^n + b_2^n = r_2^n ....4.3$$

$$c_2^{n-1} + c_2^{n-2}b_2 + c_2^{n-3}b_2^2... + c_2b_2^{n-2} + b_2^{n-1} = m_2^n ....4.4$$

$$c_2^{n-1} + c_2^{n-2}a_2 + c_2^{n-3}a_2^2..... + c_2a_2^{n-2} + a_2^{n-1} = nl_2^n ....4.5$$

$$b_2^{n-1} - b_2^{n-2}a_2 + b_2^{n-3}a_2^2..... - b_2a_2^{n-2} + a_2^{n-1} = k_2^n ....4.6$$

From equations 4.1, 4.2 and 4.3

$$a_2 = \frac{r_2^n - n^{n-1}q_2^n + p_2^n}{2} ....4.7$$

$$b_2 = \frac{r_2^n + n^{n-1}q_2^n - p_2^n}{2} ....4.8$$

$$c_2 = \frac{r_2^n + n^{n-1}q_2^n + p_2^n}{2} ....4.9$$

When we substitute and rearrange eqs 4.7, 4.8, and 4.9 on eqs 4.4, 4.5 and 4.6

$$2^{n-1}k_2^n = r_2^{n(n-1)}... + n^{n^2-2n+2}q_2^{n(n-1)}... + np_2^{n(n-1)}..............................4.10$$

$$2^{n-1}l_2^n = r_2^{n(n-1)}... + n^{n(n-1)}q_2^{n(n-1)}... + p_2^{n(n-1)}..............................4.11$$

$$2^{n-1}m_2^n = nr_2^{n(n-1)}... + n^{n^2-2n+2}q_2^{n(n-1)}... + p_2^{n(n-1)}..............................4.12$$

here eqs 4.10 and 4.12 are similar and $p_2 = r_2$ This implies $c_2 - b_2 = a_2 + b_2$ in addition to this equation are similar with first case description.
Equations 3.10, 3.11, 4.10 and 4.12 are similar. if we do for third case the number of similae Equations will increase and will disqualify the existence of one, two or the three solutions of the Fermat's problem more and more. To understand easily when we use numbers instead of n for example $n = 3$
To minimize ambiguity let restrict $a_i < b_i < c_i$

In first case Let a_1 divisible by 3

$$a_1^3 + b_1^3 = c_1^3.....................................5$$

$$c_1 - b_1 = 9p_1^3..................................5.1$$

$$c_1 - a_1 = q_1^3..................................5.2$$

$$a_1 + b_1 = r_1^3..................................5.3$$

$$c_1^2 + c_1b_1 + b_1^2 = 3m_1^3..................................5.4$$

$$c_1^2 + c_1a_1 + a_1^2 = l_1^3..................................5.5$$

$$b_1^2 - b_1a_1 + a_1^2 = k_1^3..................................5.6$$

From equations 5.1, 5.2 and 5.3

$$a_1 = \frac{r_1^3 - q_1^3 + 9p_1^3}{2}............................5.7$$

$$b_1 = \frac{r_1^3 + q_1^3 - 9p_1^3}{2}............................5.8$$

$$c_1 = \frac{r_1^3 + q_1^3 + 9p_1^3}{2}............................5.9$$

When we substitute and rearrange eqs 5.7, 5.8, and 5.9 on eqs 5.4, 5.5 and 5.6

$$4k_1^3 = r_1^6 + 3q_1^6 + 243p_1^6 + 54p_1^3q_1^3..................................5.10$$

$$4l_1^3 = 3r_1^6 + q_1^6 + 243p_1^6 + 54p_1^3r_1^3..................................5.11$$

$$4m_1^3 = r_1^6 + q_1^6 + 27p_1^6 + 2q_1^3r_1^3....................................5.12$$

$$r_1^3 = 9p_1^3 + q_1^3 + 6p_1q_1r_1......................................5.13$$

equations 5.10 and 5.11 are similar and the consequence contradict the beginning statement

In second case Let b_2 divisible by 3

$$a_2^3 + b_2^3 = c_2^3 \text{.....................................} 6$$

$$c_2 - b_2 = p_2^3 \text{..................................} 6.1$$

$$c_2 - a_2 = 9q_2^3 \text{..................................} 6.2$$

$$a_2 + b_2 = r_2^3 \text{..................................} 6.3$$

$$c_2^2 + c_2 b_2 + b_2^2 = m_2^3 \text{..................................} 6.4$$

$$c_2^2 + c_2 a_2 + a_2^2 = 3l_2^3 \text{..................................} 6.5$$

$$b_2^2 - b_2 a_2 + a_2^2 = k_2^3 \text{..................................} 6.6$$

From equations 6.1, 6.2 and 6.3

$$a_2 = \frac{r_2^3 - 9q_2^3 + p_2^3}{2} \text{............................} 6.7$$

$$b_2 = \frac{r_2^3 + 9q_2^3 - p_2^3}{2} \text{............................} 6.8$$

$$c_2 = \frac{r_2^3 + 9q_2^3 + p_2^3}{2} \text{............................} 6.9$$

When we substitute and rearrange eqs 6.7, 6.8, and 6.9 on eqs 6.4, 6.5 and 6.6

$$4k_2^3 = r_2^6 + 243q_2^6 + 3p_2^6 + 54p_2^3 q_2^3 \text{..................................} 6.10$$

$$4l_2^3 = 3r_2^6 + 27q_2^6 + p_2^6 + 2p_2^3 r_2^3 \text{..................................} 6.11$$

$$4m_2^3 = r_2^6 + 243q_2^6 + p_2^6 + 54q_2^3 r_2^3 \text{....................................} 6.12$$

$$r_2^3 = p_2^3 + 9q_2^3 + 6p_2 q_2 r_2 \text{......................................} 6.13$$

equations 6.10 and 6.12 are similar and the consequence contradict the beginning statement

In third case Let c_2 divisible by 3

$$a_3^3 + b_3^3 = c_3^3 \text{.....................................} 7$$

$$c_3 - b_3 = p_3^3 \text{..................................} 7.1$$

$$c_3 - a_3 = q_3^3 \text{..................................} 7.2$$

$$a_3 + b_3 = 9r_3^3 \text{..................................} 7.3$$

$$c_3^2 + c_3 b_3 + b_3^2 = m_3^3 \text{..................................} 7.4$$

$$c_3^2 + c_2 a_3 + a_3^2 = l_3^3 \text{..................................} 7.5$$

$$b_3^2 - b_3 a_3 + a_3^2 = 3k_3^3 \text{..................................} 7.6$$

From equations 7.1, 7.2 and 7.3

$$a_3 = \frac{9r_3^3 - q_3^3 + p_3^3}{2} \text{............................} 7.7$$

$$b_3 = \frac{9r_3^3 + q_3^3 - p_3^3}{2} \text{............................} 7.8$$

$$c_3 = \frac{9r_3^3 + q_3^3 + p_3^3}{2} \text{............................} 7.9$$

When we substitute and rearrange eqs 7.7, 7.8, and 7.9 on eqs 7.4, 7.5 and 7.6

$$4k_3^3 = 27r_3^6 + q_3^6 + p_3^6 - 54p_3^3q_3^3 \text{..................................} 7.10$$

$$4l_3^3 = 243r_3^6 + q_3^6 + 3p_3^6 + 54p_3^3r_3^3 \text{..................................} 7.11$$

$$4m_3^3 = 243r_3^6 + 3q_3^6 + p_3^6 + 54q_3^3r_3^3 \text{....................................} 7.12$$

$$9r_3^3 = p_3^3 + q_3^3 + 6p_3q_3r_3 \text{......................................} 7.13$$

equations 7.11 and 5.12 are similar and the consequence contradict the beginning statement
In general the three cases and the twelve equations exist simultaneously if Fermat's Equation has non-zero solution for powers odd primes. Then Equations are in polynomial for and equations:- 5.10, 5.11, 6.10, 6.12, 7.11, and 7.12 are similar and their solutions are the same with in their similar coefficients and powers order. The more similar equations are 5.12 and 6.11 and 5.13 and 6.13. This disqualifies the begging statement in different ways. disorder the first stated order, contradict the existence of cases, and contradict the existence of factor n for one of the triplet n. QED