

Proof for Fermat's Last Theorem for odd prime

$$a^p + b^p = c^p, a, b, c \text{ are co-prime and } p \text{ is odd prime}$$

Abstract: *It is not my intention to repeat what is there in great mathematician's books/papers. I am presenting whatever I understood so far from the fundamental principles of mathematics like Binomial theorem for Prime Powers. FLT is already proved by Andrew Wiles using Advanced Mathematics. This is my humble attempt to prove the FLT in algebraic way.*

If we want to solve any equation, we may solve it using fundamental principles of mathematics. If the equation to be solved is $a^p + b^p = c^p$ (a, b, c are all integers > 0), there are three unknowns, we need three equations.

All a, b, c are co-primes, meaning they don't share any common factor (CF). For all even powers, we have proof from Fermat himself; therefore, it is sufficient to prove only for odd primes (primes greater than 2).

Conditions for (a + b) and c

- $(a + b) = c \Rightarrow (a+b)^p = c^p$, then $a^p + b^p < c^p$
- $(a + b) < c \Rightarrow (a+b)^p < c^p$, then also $a^p + b^p < c^p$
- $a + b > c \Rightarrow (a+b)^p > c^p$, then it is possible to have $a^p + b^p = c^p$

Fermat's Little Theorem

$$c^p - c = pC \Rightarrow c^p = c + pC$$

$$a^p - a = pA \Rightarrow a^p = a + pA$$

$$b^p - b = pB \Rightarrow b^p = b + pB$$

$$\text{If } c^p = a^p + b^p \Rightarrow c + pC = a + pA + b + pB$$

$$\Rightarrow a + b - c = p(C - A - B)$$

$$a + b - c = 6pK \text{ [FLTTILE EQUATION]}$$

Binomial Theorem for Prime Powers

Using the expansion of $(a + b)^p$, if p is an odd prime:

$$(a + b)^p = a^p + b^p + p * ab(a + b) * f(a, b)$$

If $a^p + b^p = c^p$, then:

$$c^p = (a + b)^p - p * ab(a + b) * f(a, b)$$

$$c^p = (a + b)[(a + b)^{p-1} - pab(f(a, b))]$$

Conclusion

The analysis shows that one of a , b , c , or $f(a, b)$ should be a multiple of p . Through the argument provided, if p does not divide a , b , or c , then $f(a, b)$ must be a multiple of p , which eventually forces c to be a multiple of p . The text concludes that there are no such integer solutions.

END of Entertainment ESSAY