FERMAT'S LAST THEOREM

A proof in formal Logic?

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October 2011

The theorem as originally noted in the margin of Fermat's own text book is generally written as follows:-

$$x^n + y^n \neq z^n \qquad n \leq 3$$

but no proof of the theorem had been found until that published by Wiles and Taylor in 1993 and subsequently amended by them some eighteen months later. The Wiles-Taylor proof is now widely accepted but it has to be said that it is not universally accepted and some doubt remains as to its survivability in the long term.

Be that as it may, I now intend to submit a proposition which although not a formal proof in arithmetic is, I believe, satisfactory as a proof in formal logic.

My approach to this proposition is firstly to establish certain axioms which will then lead to an expression in formal logic and these axioms are as follows:-

1/ There exists an infinite set of integers.

2/ The expression $x^2 + y^2 = z^2$ constitutes an infinite set of expressions known as Pythagorean triples such as $3^2 + 4^2 = 5^2$ and $5^2 + (12)^2 = (13)^2$, These being the best known although many other examples are known to exist and for future reference, I will designate this set by the symbol ‘p’.

3/ The expression $x^2 + y^2 \neq z^2$ constitutes an infinite set of expressions known as non-Pythagorean triples and for future reference I will designate this set by the symbol ‘q’.

4/ Contained within (1) -the infinite set of integers- there is an infinite number of possible triple sets.

5/ The infinite set of Pythagorean triples is contained in the infinite set of triple sets (4) and similarly the infinite set of non-Pythagorean triples is also contained in the infinite set of triple sets and for future reference I will designate axiom (5) by the symbol ‘r’.

A theorem in formal logic can be applied to ‘p’, ’q’ and ‘r’ and that theorem reads as follows:-

$$(p \supset r) \supset [(q \supset r) \supset \{(p \vee q) \supset r\}]$$

This expression formulates a necessary truth and for the sake of clarity it can be explained in plain language as follows:-

If (if p then r), then [if (if q then r) then {if (if either p or q) then r}]

In other words, it can be shown that infinite sets of both Pythagorean triples and non-Pythagorean triples exist within the infinite set of integers and I offer this by way of a proof of Fermat’s Last Theorem.

END