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A Proof of Fermat's Last Theorem

In this paper, I provide a proof of Fermat's last theorem which states that there is no integer solution for a, b, and c in the equation $a^n + b^n = c^n$ where $n \in \mathbb{Z}$ and $n > 2$. [1]

Proof:

$$a^m + b^m = c^m; m \in \mathbb{Z}$$

$$a^m = c^m - b^m$$

$$a(a^m) = a(c^m - b^m)$$

$$a^{m+1} = a(c^m - b^m)$$

$$a^{m+1} + b^{m+1} = a(c^m - b^m) + b^{m+1}$$

Let $n = m + 1$

$$a^n + b^n = a(c^{n-1} - b^{n-1}) + b^n$$

If $a^n + b^n = c^n$, then $a^n = c^n - b^n$ and $a = \sqrt[n]{c^n - b^n}$

$$\therefore c^n - b^n + b^n = a(c^{n-1} - b^{n-1}) + b^n$$

$$c^n = a(c^{n-1} - b^{n-1}) + b^n$$

$$c^n - b^n = a(c^{n-1} - b^{n-1})$$

$$\frac{c^n - b^n}{c^{n-1} - b^{n-1}} = a = \sqrt[n]{c^n - b^n}$$

$$\frac{c^n - b^n}{c^{n-1} - b^{n-1}} = \sqrt[n]{c^n - b^n}$$

Let $n = 2$

$$\frac{c^2 - b^2}{c - b} = \sqrt{c^2 - b^2}$$

$$\frac{(c + b)(c - b)}{c - b} = \sqrt{c^2 - b^2}$$

$$c + b = \sqrt{c^2 - b^2}$$

If $a^n + b^n = c^n$, then $\sqrt[n]{c^n - b^n} = \frac{c^n - b^n}{c^{n-1} - b^{n-1}}$

Reference

[1] Singh, pp. 18–20.