

Faculty of Science
The University of Manitoba

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:

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

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

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

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

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

$$\text{Let } n = m + 1$$

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

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

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

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

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

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

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

$$\text{Let } n = 2$$

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

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

Reference

[1] Singh, pp. 18–20.