Elementary proof of The Fermat's Last Theorem

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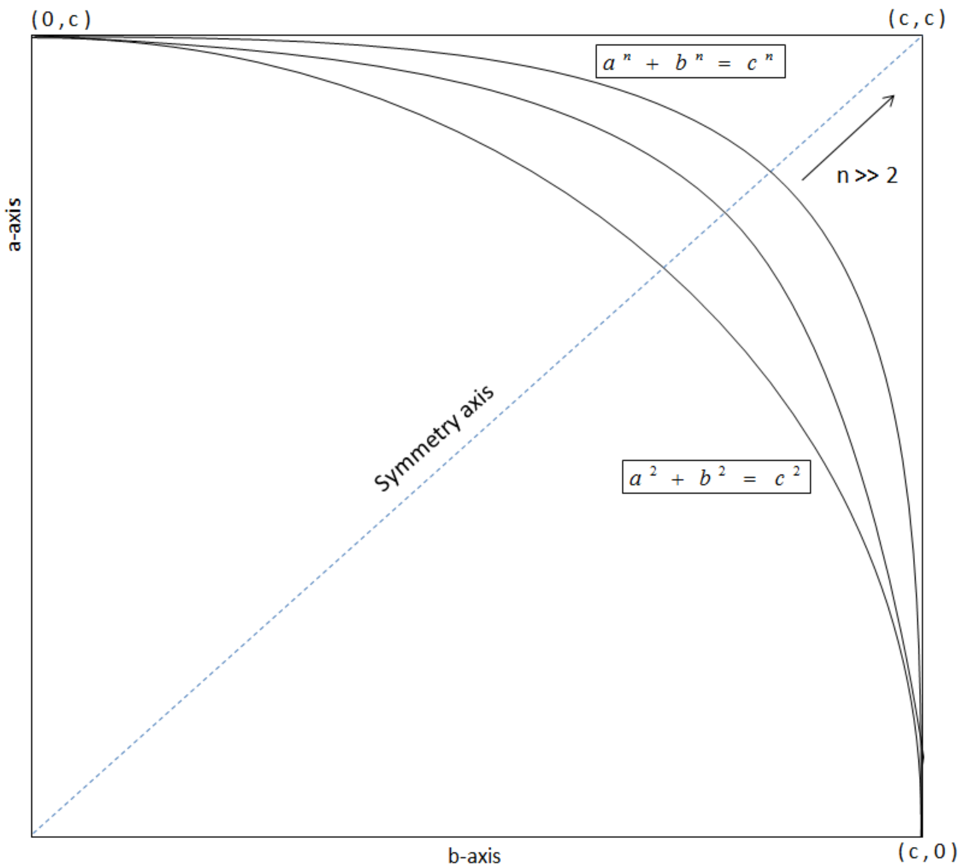
Fermat's Last Theorem (FLT) :

$a^n + b^n \neq c^n$, no integer a , b , c if $n > 2$

Prove ,

Draw the graph (Pic.1) as below, I consider only 1st quadrant.

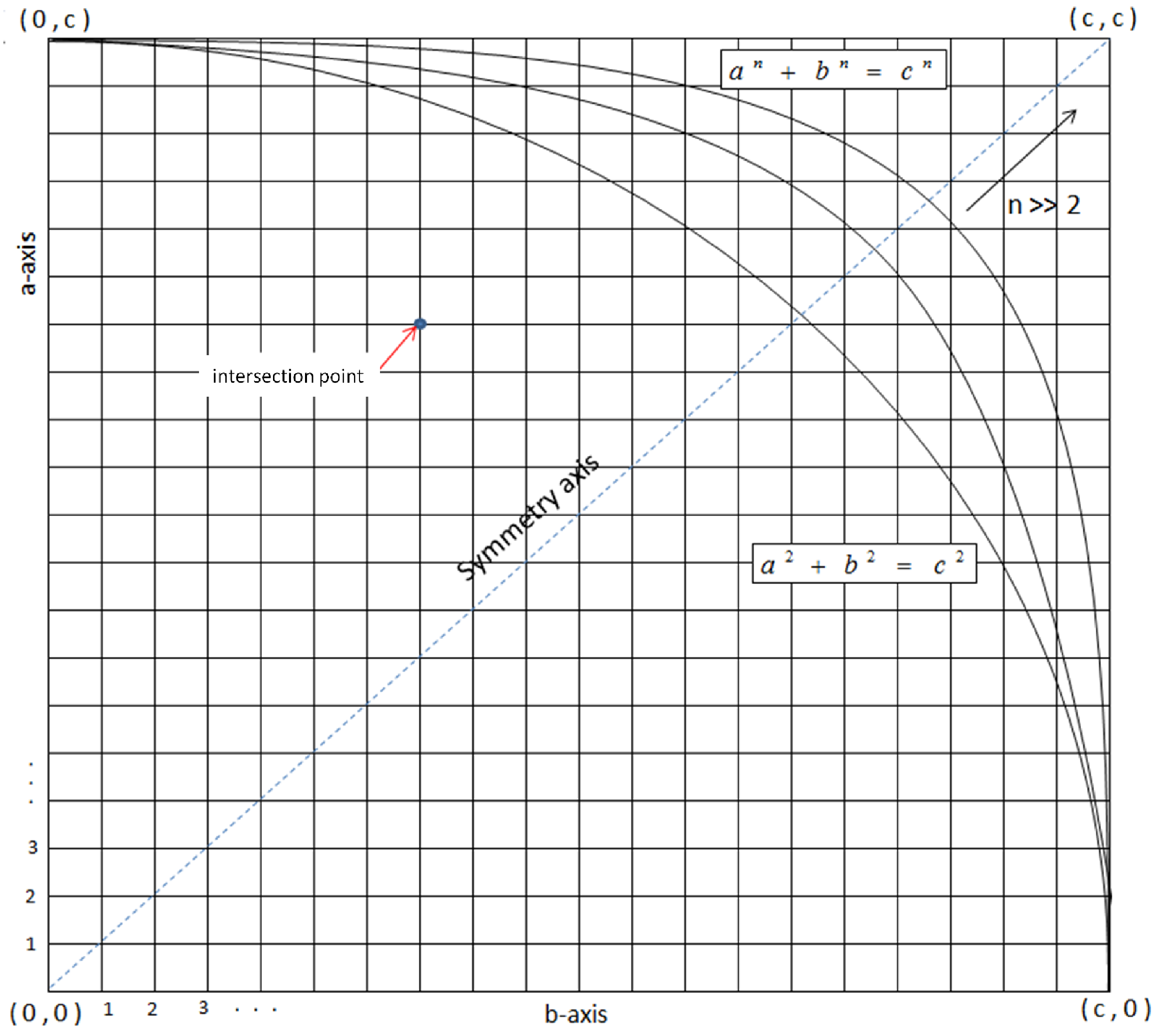
Pic .1



From Pic. 1 : if n is more , the curve will be near the point (c , c)

Then I make the grid (square 1 x 1) as below,

Pic. 2

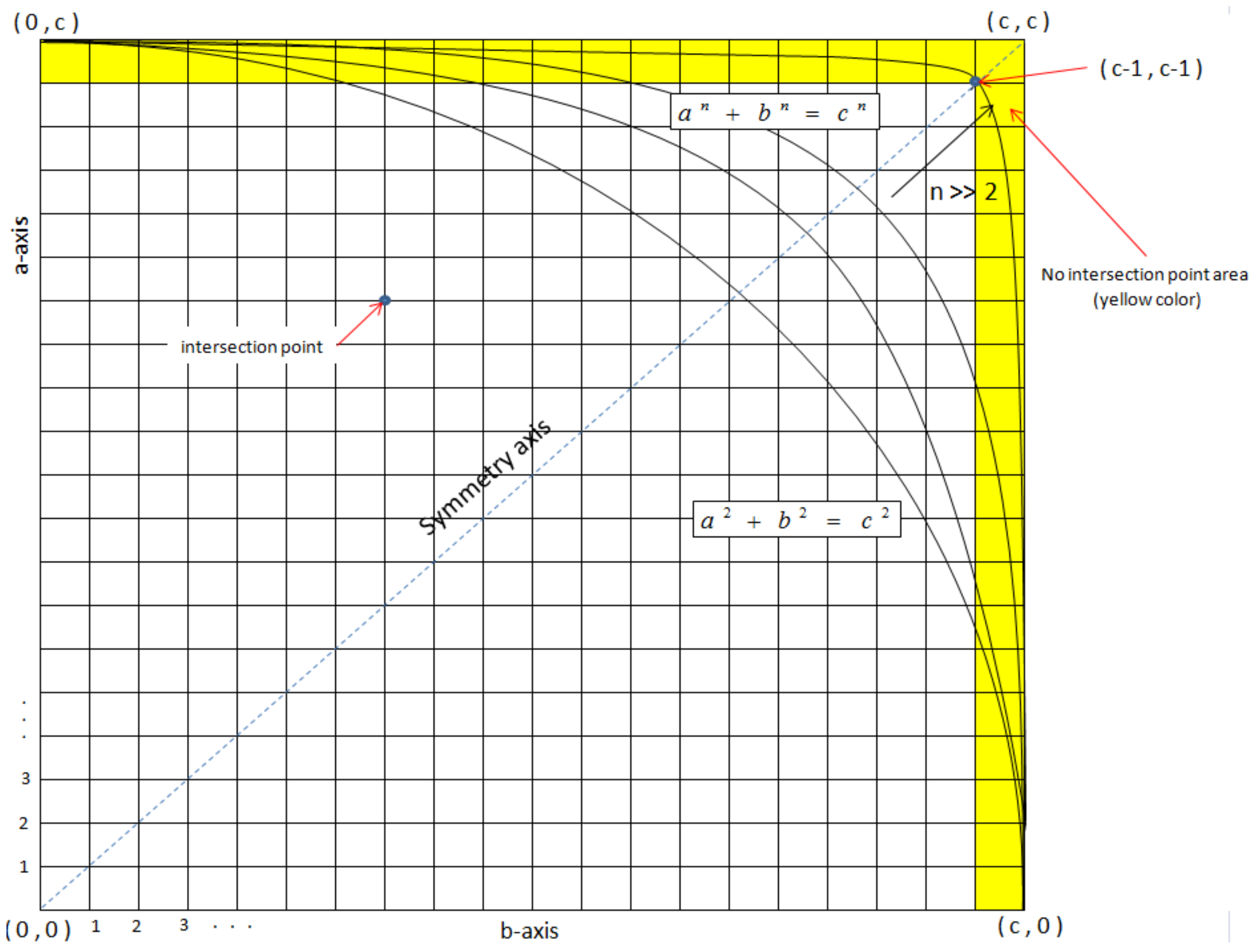


Now I can define the intersection point means the integer, and I will prove these curves will not pass the intersection point for n > 2.

No intersection point area

There are no intersection point area (yellow area) , all curves in this area are within FLT.

Pic. 3



Next , I will find the intersection point between the curves and the symmetry axis.

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

$$b = \frac{c}{\sqrt[n]{2}} \qquad \text{\_\_\_\_\_\_\_\_\_\_\_\_\_\_(1)}$$

From (1) , b can't be the integer, the curves will not pass the symmetry axis at intersection point.

From the Pic. 3, I will find the relation between b and c at the point (c-1 , c-1),

$$\frac{c}{\sqrt[n]{2}} = c - 1$$

$$n = \frac{\ln(2)}{\ln(\frac{c}{c-1})} \qquad \text{\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (2)}$$

From (2), in the no intersection point area, it can be determined

$$n > \frac{\ln(2)}{\ln(\frac{c}{c-1})} \qquad \text{\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_(3)}$$

Next, consider the curves in the no intersection point area.

$a^n + b^n = c^n$, a and b are not the integers.

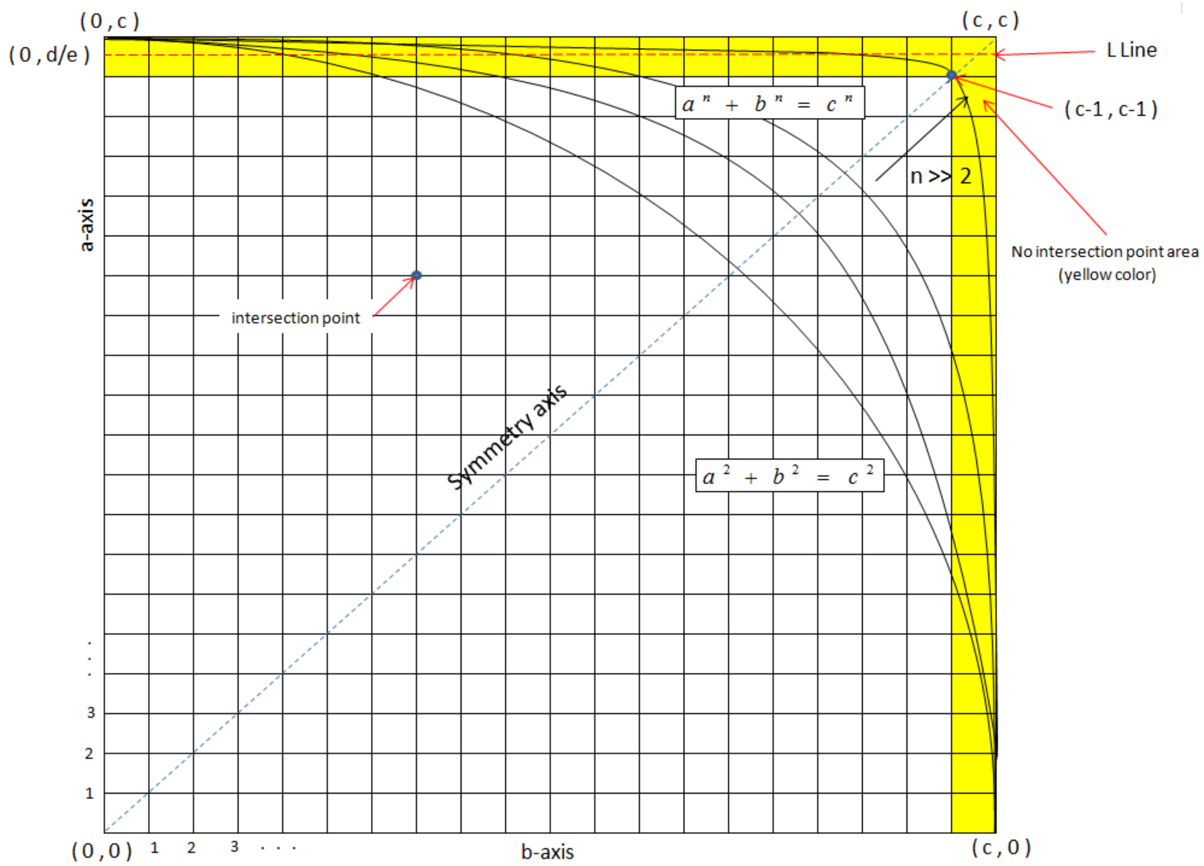
a and b may be the rational or irrational numbers,

Assume a and b are the rational number, $a = \frac{d}{e}$ and $b = \frac{f}{e}$

(d , e) = 1 , (f , e) = 1 and d , e , f are the intergers.

$$(\frac{d}{e})^n + (\frac{f}{e})^n = c^n \qquad \text{\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_(4)}$$

Pic. 4



See pic. 4, I draw the line (L line) in the no intersection point area.

The line will pass all the curves for all degree of n → ∞.

Assume L line pass a-axis at $\frac{d}{e}$, it can be written as below,

$$(\frac{d}{e})^{n_1} + (\frac{f_1}{e})^{n_1} = c^{n_1} \qquad \text{for } n = n1$$

$$(\frac{d}{e})^{n_2} + (\frac{f_2}{e})^{n_2} = c^{n_2} \qquad \text{for } n = n2$$

$$(\frac{d}{e})^{n_3} + (\frac{f_3}{e})^{n_3} = c^{n_3} \qquad \text{for } n = n3$$

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$$(\frac{d}{e})^{n_\infty} + (\frac{f_\infty}{e})^{n_\infty} = c^{n_\infty} \qquad \text{for } n \to \infty$$

$f_1 < f_2 < f_3 < \ldots < f_\infty$ and $n_1 < n_2 < n_3 < \ldots < n_\infty$

Multiply the e^n all of the equation,

d^{n_1} + $f_1^{\ n_1}$ = $(ce)^{n}{}_{1}$ for n = n1

d^{n_2} + $f_2^{\ n_2}$ = $(ce)^{n_2}$ for n = n2

d^{n_3} + $f_3^{\ n_3}$ = $(ce)^{n_3}$ for n = n3

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d^{n_∞} + $f_\infty^{\ n_\infty}$ = $(ce)^{n_\infty}$ for n → ∞

All equations show it can be written in the form $a^n + b^n = c^n$ by a, b, c can be the intergers.

But it is conflict with (3), if n > $\dfrac{\ln(2)}{\ln(\frac{ce}{ce-1})}$ the curves will not pass the intersection point.

it can't be written in the form $a^n + b^n = c^n$ for n → ∞

So I can judge a and b aren't the rational numbers. But they are the irrational numbers in the no intersection point area.

$a^n + b^n = c^n$, a and b are the irrational numbers in the intersection point area.

From the above conclusion,

Multiply $(\frac{x}{c})^n$ into the equation $a^n + b^n = c^n$

$$(\frac{ax}{c})^n + (\frac{bx}{c})^n = (x)^n \qquad \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_(5)$$

x is any integer 1 , 2 , 3 ,…

But $\frac{ax}{c}$ and $\frac{bx}{c}$ are the irrational numbers because a and b are the irrational numbers

So I can say a , b , c can't be the integers at the same time.

Finally, I can prove , $a^n + b^n \neq c^n$ for n > 2 _________ FLT is proved. Finish !!!