Proof of Fermat's last theorem (Part I of III)

$a^n + b^n = c^n$ (n > 1 and odd)

Objet: Proof of Fermat's last theorem with conventional means.

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1) Introduction :

- ✓ I am not a professional of mathematics.
- ✓ My English is poor. I use **google translate** to write these pages.

2) I prove that c < (a + b)

$$(a+b)^n = a^n + b^n + \sum_{k=1}^{n-1} \binom{n-1}{k} a^k b^{n-k}$$

Then $(a+b)^n > (a^n + b^n)$

Then $(a+b)^n > c^n$ because $c^n = a^n + b^n$

Then $(a+b) > c$

d is a natural number. It is the complement of c to (a + b).

c + d = a + b

c = a + b – d

c – b = a – d

c – a = b – d

3) I prove a parity of d

Whatever the parity of a, b and c, we can easily verify that d is always even.

a	b	c	d
even	even	even	even
even	odd	odd	even
odd	even	odd	even
odd	odd	even	even

2^n divide d^n.

4) Conditions (supposition) to prove Fermat's last theorem :

- ✓ a, b, c, d and n are non-zero positive integers
- ✓ a, b and c are pairwise coprime
- ✓ $n > 1$ and odd
- ✓ $a^n + b^n = c^n$
- ✓ $a + b = c + d$
- ✓ $a < b$

5) I prove that c is not coprime with d

$d^n = d^n$

$c^n - a^n - b^n = 0$

$d^n = d^n + c^n - a^n - b^n$

$d^n = (d^n + c^n) - (a^n + b^n)$

$(c + d)$ divide $(d^n + c^n)$

$(a + b)$ divide $(a^n + b^n)$

$(c + d) = (a + b)$

$(c + d)$ divide d^n

Any integer which divide $(c + d)$ *divide* d^n

Any prime number which divide $(c + d)$ *divide* d^n

Any prime number which divide $(c + d)$ *divide* d

Any prime number which divide $[(c + d)$ *and* $d]$ *divide* c

c is not coprime with d

$(c + d) = (a + b)$

$(a + b)$ divide d^n

Any prime number which divide $(a + b)$ *divide* d

6) I prove that a is not coprime with d

$d^n = d^n$

$c^n - a^n - b^n = 0$

$d^n = d^n + c^n - a^n - b^n$

$d^n = (c^n - b^n) - (a^n - d^n)$

$(c - b)$ *divide* $(c^n - b^n)$

$(a - d)$ *divide* $(a^n - d^n)$

$(c - b) = (a - d)$

$\boldsymbol{(a - d)}$ ***divide*** $\boldsymbol{d^n}$

$\boldsymbol{(c - b)}$ ***divide*** $\boldsymbol{d^n}$

Any integer which divide $(a - d)$ divide d^n
Any prime number divide $(a - d)$ divide d^n
Any prime number divide $(a - d)$ divide d
Any prime number divide $[(a - d)$ and $d]$ $divide\ a$
$\boldsymbol{a\ is\ not\ coprime\ with\ d}$ **(Except if (a - d) = 1).**
$(c - \ b) \ = \ (a - d)$
$\boldsymbol{(c - b)\ divide\ d^n}$
Any prime number which divide $(c - b)$ $\ divide\ d.$

7) <u>I prove that b is not coprime with d</u>
$d^n = \ d^n$
$c^n - a^n \ - \ b^n = 0$
$d^n = \ d^n + c^n - a^n \ - \ b^n$
$d^n = (c^n - \ a^n) - (b^n - d^n)$
$(c - \ a)\ divide\ (c^n - \ a^n)$
$(b - d)\ divide\ (b^n - d^n)$
$(c - \ a) \ = \ (b - d)$
$\boldsymbol{(b - d)\ divide\ d^n}$
$\boldsymbol{(c - a)\ divide\ d^n}$
Any integer which divide $(b - d)$ divide d^n
Any prime number divide $(b - d)$ divide d^n
Any prime number divide $(b - d)$ divide d
Any prime number divide $[(b - d)$ and $d]$ $divide\ b$
$\boldsymbol{b\ is\ not\ coprime\ with\ d}$
$(c - \ a) \ = \ (b - d)$
$\boldsymbol{(c - a)\ divide\ d^n}$
Any prime number which divide $(c - a)$ $\ divide\ d$

8) Contraductions

I proved that:

1. Any prime number which divide $(a+b)$ $divide\ d$.
2. Any prime number which divide $(c+d)$ $divide\ d$.
3. Any prime number which divide $(a-d)$ $divide\ d$.
4. Any prime number which divide $(c-b)$ $divide\ d$.
5. Any prime number which divide $(b-d)$ $divide\ d$.
6. Any prime number which divide $(c-a)$ $divide\ d$.

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