Fermat's Theorem

$X^n + Y^n = Z^n$ [1.1]

n is a prime number, n > 2; X, Y, Z are integers.

Decisions can be X, Y-coprime numbers.

There are two options: X, Y-even and odd, Z-odd

or X, Y- is odd,Z-even.

1.Decomposition [1.1] on multipliers.

If n is odd number, then $X^n + Y^n$ will on multipliers :

$$X^n + Y^n = (X + Y)(X^{n-1} - X^{n-2}*Y^{} +...-X * Y^{n-2} + Y^{n-1})$$

where the second brace geometric progression

the first member of the a1 = X^{n-1}, and q multiplier =-Y/X.

The sum of which S = $a1(1-q^n)/(1-q)$:

$$S = (X^n + Y^n)/(X+Y)$$

$$Z^n = Z11 * Z22$$

where

$$Z11 = X + Y$$

$$Z22 = X^{n-1} - X^{n-2}*Y +...-X * Y^{n-2} + Y^{n-1}$$

2. Another view of the Z22.

If we summarize the regularly spaced members of environments

-the Member of the progression of the Z22 in pairs are:

$$X^{n-1} + Y^{n-1} = (X + Y)(X^{n-2} + Y^{n-2}) - X*Y^{n-2} - Y*X^{n-2} =$$
$$=... -X*Y(X^{n-3} + Y^{n-3})= ...-X*Y(X + Y)(X^{n-4} + Y^{n-4})+$$
$$+X^2 * Y^{n-3} + Y^2 * X^{n-3} = ...+X^2 *Y^2 (X^{n-5} + Y^{n-5}) =$$
$$=... + X^{(n-3)/2} * Y^{(n-3)/2} *(X^2 + Y^2 + 2*X*Y - 2*X*Y)=$$
$$= ...(-1)^{(n-1)/2} *2 *X^{(n-1)/2} * Y^{(n-1)/2}$$
$$-X^{n-2} * Y - X * Y^{n-2} = -X*Y(X^{n-3} + Y^{n-3}) = ... +$$
$$+X^{(n-3)/2} * Y^{(n-3)/2} *(X + Y)^2 + (-1)^{(n-1)/2} *2 * X^{(n-1)/2} * Y^{(n-1)/2}$$

...

$$X^{(n-3)/2} * Y^{(n+1)/2} + X^{(n+1)/2} * Y^{(n-3)/2} =$$
$$= X^{(n-3)/2} * Y^{(n-3)/2} *(X^2 + Y^2 + 2*X*Y - 2*X*Y)=$$
$$= X^{(n-3)/2} * Y^{(n-3)/2} *(X + Y)^2 -2*(-1)^{(n-1)/2} *$$
$$*X^{(n-1)/2} *Y^{(n-1)/2}$$

and the sum of the average member of the progression

and it said this:

$$(-1)^{(n-1)/2} *(n-1)/2 * 2*X^{(n-1)/2} *Y^{(n-1)/2} +$$
$$+ (-1)^{(n-1)/2} *X^{(n-1)/2} *Y^{(n-1)/2} = n*(-1)^{(n-1)/2} *$$
$$*X^{(n-1)/2} *Y^{(n-1)/2}$$

According to the above Z22 representable as:

$$Z22= k*(X + Y)^2 + n*(-1)^{(n-1)/2} *X^{(n-1)/2} *Y^{(n-1)/2}$$

$$Z11 = X + Y$$

If X + Y does not have a multiplier-n

$$Z11 = Z1^n$$
$$Z22 = Z2^n$$

where Z1 and Z2-inter simple, otherwise between X and

Z must be a common factor that is not valid.

Consider the case where X is divided into n;

Let X contains n. then let Z = Y + A :

$$X^n + Y^n = (Y + A)^n$$

After the conversion, we have:

$$X^n = n * Y^{n-1} * A + n * (n - 1)/2 * Y^{n-2} * A^2 +...+$$
$$+ n * Y * A^{n-1} + A^n \quad [2.1]$$

First cut the prime number n would lead to his presence in A^n

member and since he is the only one in [2.1] without

multiplier of n and repeated reduction of n its presence and

will need to divide by n and Y^{n-1}.

That is not permissible;X and Y coprime numbers.

Similarly, these thoughts in the p2 we have:

$Z-Y=X1^{n}$ [2.2]

$Z-X=Y1^{n}$ [2.3]

3.take Z = X+Y-B, then:

$X^{n} + Y^{n} = (X + Y - B)^{n}$,

over the bracket and get:

$$X^{n} + Y^{n} = (X + Y)^{n} - n * (X + Y)^{n-1} * B + ...+$$
$$+ n * (X + Y) * B^{n-1} - B^{n} \quad [3.1]$$

Unveiling the $(X + Y)^{n}$ and leave out both parts of the X^{n} and Y^{n}

and then the only member of the B^{n} -factor n.

B has a factor of n.

Then, if X + Y is not included n:

$B = X - X1^{n} = Y - Y1^{n} = Z1^{n} - Z$ [3.2]

$X = X1 + n*X1*Y1*Z1*K$ [3.3]

$Y = Y1^{n} + n*X1*Y1*Z1*K$ [3.4]

$Z1^{n} = X1^{n} + n*X1*Y1*Z1*2*K + Y1^{n}$ [3.5]

where is k- any integer

Z1 = X1 + Y1

The other view will cause the numerical K,X1,

Y1, change that does not affect the [3.5]

$2*K = [(X1 + Y1)^{n} - X1^{n} - Y1^{n}]/n*X1*Y1*Z1$ [3.6]

4.Let X1 + Y1 = Z1

Right side [3.6]-cannot be even number.

According to Newton's binomial $Z1^{n}$ has the form:

$$X1^{n-3} + E2 * X1^{n-4} *Y1 + ... +ES * X1^{(n-3)/2} *Y1^{(n-3)/2} + ...+$$

$$+ E2*X1 *Y1^{n-4} + Y1^{n-3} \quad [4.1]$$

where E is the sum of the corresponding combinations replication $X1^{\{\}} * Y1^{\{\}}$.

When X1,Y1 different parity obviously [4.1]-odd.

Cut on the Z1 the right piece [3.5]

$$[(X1 + Y1)^{n-1} - (X1^{n-1} - X1^{n-2} * Y1 + ... - X1 * Y1^{n-2} + Y1^{n-1})]/$$

$$/n*X1*Y1 \quad [4.2]$$

If X1 and Y1-odd, the second brace contained n-odd members,

and expression is odd.

We pass to the general case

$Z1 = X1 + Y1 + a$

where a-any integer with a sign + or -.

According to [3.4] we have:

$$(X1 + Y1 + a)^n = X1^n + n*X1*Y1*Z1*2*K + Y1^n$$

and further we will present:

$2K = K1 + K2$

where K1-odd number, at which $Z1 = X1 + Y1$

After transformation we have:

$$(X1 + Y1)^n + n*(X1 + Y1)^{n-1} * a + ... + n*(X1 + Y1) * a^{n-1} +$$

$$+ a^n = X1^n + n*X1*Y1*Z1*K1 + n*X1*Y1*Z1*K2 + Y1^n$$

From what follows:

$$n*X1*Y1*(X1 + Y1)*K2 = n*(X1 + Y1)^{n-1} * a + ... + n*(X1 + Y1) * a^{n-1} + a^n \quad [4.3]$$

a^n and X1 + Y1 has the general multiplier, we will call it (c).

Thus

(c) belonging to € (a) - c^i ;

(c) belonging to € (X1 + Y1) - c^j .

If $c^j > c^i$ that

$K = [(X1 + Y1 + a)^{n} - (X1+Y1)(X1^{n-1} - \dots + Y1^{n-1})]/2*n*X1*Y1*(X1 + Y1 + a)$

that K-contains (c) that is impossible as between Z2 and Z1 there will

be the general multiplier that follows from [3.2]

$Z1^{n-1} - Z2 = n*X1*Y1*K$ and it isn't admissible.

We will note also that $(X1^{n-1} - \dots + Y1^{n-1})$ - has no multiplier (c) of p2.

It agrees contains (a) all multipliers belonging above X1+Y1.

We will designate $a/(X1 + Y1)^{j} = L$.

$$Z1 = X1 + Y1 + L(X1 + Y1)^{j}$$

$$K2 = 2* K - K1$$

$$K2 = [(X1 + Y1 + L(X1 + Y1)^{j}]^{n} - X1^{n} - Y1^{n})]/n*X1*Y1*[(X1 + Y1 + L(X1 + Y1)^{j}] -$$

$$- [(X1 + Y1)^{n} - X1^{n} - Y1^{n}]/n*X1*Y1*(X1 + Y1)$$

after transformation we have:

$$K2 = [(X1 + Y1 + L(X1 + Y1)^{J}]^{n} * (X1 + Y1) - (X1 + Y1)^{n} *[(X1 + Y1 + L(X1 + Y1)^{j}]+$$

$$+ L(X1 + Y1)^{j} *(X1^{n} + Y1^{n})/$$

$$/n*X1*Y1*(X1 + Y1)*[(X1 + Y1 + L(X1 + Y1)^{j}]$$

$$K2 = L* (X1 + Y1)^{n-1+j-1} /n*X1*Y1 + L*(X1 + Y1)^{j-1} * (X1^{n} + Y1^{n})/$$

$$/n*X1*Y1[X1 + Y1 + L(X1 + Y1)^{j}]$$

$$K2 = [X1 + Y1 + L(X1 + Y1)] * L* (X1 + Y1)^{n+j-2} + L*(X1 + Y1)^{j-1} * (X1^{n} + Y1^{n})/$$

$$/ n*X1*Y1[X1 + Y1 + L(X1 + Y1)^{j}]$$

$$K2 =(X1 + Y1)^{j-1} * \{[X1 + Y1 + L(X1 + Y1)^{j}] * L* (X1 + Y1)^{n-1} + L * (X1^{n} +Y1^{n})\}$$

$$/ n*X1*Y1[X1 + Y1 + L(X1 + Y1)^{j}] \quad [4.4]$$

Brace {} contents after reduction on (X1 + Y1) in a denominator

doesn't may contain the specified multiplier as the first composed

him supports, and the second isn't presen $L*(X1^{n} + Y1^{n})/(X1 + Y1)$

p.2.So the possible multiplier in K2 is $(X1 + Y1)^{j-1}$ [4.4]

That the decision in integers for [4.3] needed to be had in K2 multiplier (X1 + Y1) in that minimum degree which contains

member on the right side

$$n^* (X1 + Y1)^{n-1} * a = n^* (X1 + Y1)^{n-1} * (X1 + Y1)^{j} =$$

$$= n * (X1 + Y1)^{n-1+J}$$

There is no coincidence of possible and necessary K2.

Thus a = 0.

In a consequence of that in case of X + Y doesn't contain n multiplier,

in integers there is no decision.

5. If X + Y is a factor of n, that the only

possible according to p4.

The only available option

$$Z11 = n^{(m*n - 1)} *Z1^{n} \quad [5.1]$$

$$Z22 = n*Z2^{n} \quad [5.2]$$

as set out in paragraph2 Z22 is divided into

general n and more.

The option where in the X or Y is a factor of n

has no solution in integers as Z already contains n.

Which means:

$$2*Z = X1^{n} + Y1^{n} + Z11$$

$X1^{n} + Y1^{n}$ contains a factor of n^{2}, which follows

from the

respective grouped expression based on Newton's

binomial:

$$(X1 + Y1)^{n} - n*X1*Y1(X1^{n-2} + Y1^{n-2}) -n*(n-1)/2*X1^{2}*Y1^{2}*$$
$$* (X1^{n-4} + Y1^{n-4}) - ... -C^{n}_{K} *X1^{K} *Y1^{K} (X1^{n-2*k} + Y1^{n-2*k})-$$
$$-...-C^{n}_{1} * X1^{(n-1)/2} * Y1^{(n-1)/2} * (X1 + Y1)$$

where odd degree have the multiplier (X1 + Y1)

together with the n.

So [5.1] minimum m = 2.

Suppose there exist integers X = X1,Y = Y1, Z [1.1]

implementation is carried out. then as shown

above there is

$$X1 + Y1 = n^{m*n-1} * Z1^{n}$$

$$Z22 = n*Z2^{n}$$

$$Z^{n} = n^{m*n} * Z1^{n} *Z2^{n}$$

And with that Z [1.1] has more solutions to $X2 = n^{m} *X3$;

$$Y2 = n^{m} * Y3; \; Z = n^{m} * Z1^{n} *Z2^{n}$$

$$X3 + Y3 = Z1^{n}$$

$$Z11 = n^{m} * Z1^{n}$$

$$Z22 = n^{nm-m} *Z2^{n}$$

$$X1^{n} + Y1^{n} = X2^{n} + Y2^{n} = n^{m*n} * Z1^{n} *Z2^{n} = Z^{n}$$

However second decision

$$n^{m*n} * X3^{n} + n^{m*n} * Y3^{n} = n^{m*n} (Z1*Z2)^{n}$$

not solvable in whole numbers

Since the reduction of the n we get the equivalent:

$$X3^{n} + Y3^{n} = (Z1*Z2)^{n}$$

where the Z11 is not n which means that there

is no integer solutions p.4 and p.5.

QED!