Victor Sorokine

Fermat's last theorem

In Memory of my MOTHER

All calculations are done with numbers in base n, a prime number greater than 2.

The notations:

A', A", A"', $A_{(t)}$ – the first, the second, the third, the t-th digit from the end of the number A.;

$A_{[t]}$ – is the k-digit ending of the number A (i.e. $A_{[t]}$ =A mod n^t).

0°) **Lemma**.

The sum of the numbers a_i^n (where a_i=1, 2... n-1) ends by d00, where d is a digit and d=(n-1)/2.

Proof of the first case of the FLT

Let's assume that for co-prime natural numbers A, B, C, where (ABC)'≠0 and n is a prime number n>2,

1°) [D=] $A^n+B^n-C^n=0$, where, as it is known [see viXra:1707.0410],

$(A+B-C)_{[2]}=0$ and A'+B'-C' is either 0 or n-1, and therefore the digit

2°) u"=(A"+B"-C")' is either 0 (if A'+B'-C'=0) or n-1 (if A'+B'-C'=n).

3°) If we multiply 1° by g^{nnn}, where g=1, 2, ... n-1, we find n-1 equivalent equations..

Leave in all equations 3° only the last digits, i.e. put A=A', B=B', C=C'. Then the sum of powers for each of the letters A, B, C, as well as the total sum of all n-1 of the numbers D of 3°, has an ending d00 has an ending d00 [where d=(n-1)/2 – see 0°].

In each the equations 3° the digit D"'>0 [otherwise after the operation 3° with this equality with D"'=0 the digit D"' in the total sum is also zero] and there is equality with

4°) D"'>1 [otherwise, in the total sum of n-1 equals 3°, digit D"'≠(n-1)/2].

However, restoring in the equation 4° digits of A", B", C " cannot convert this digit into 0 because, as it follows from the binomial theorem

5°) $A^n=(...+A''n+A')^n$, $B^n=(...+B''n+B')^n$, $C^n=(...+C''n+C')^n$

and from the Small Theorem, the third digit in the sum of the penultimate three terms in the binomial decomposition – $(A'^{n-1}A''+B'^{n-1}B''-C'^{n-1}C'')'$ [=u'', i.e. 0 or n-1, – see 3°], where $A'^{n-1}{}'=B'^{n-1}{}'=C'^{n-1}{}'= 1$, – it is either 0 or n-1 (see 2°).

Thus, Fermat's equality in the first case is contradictory in the third digit also for two-digit numbers A, B, C. Well, the third and subsequent digits of the bases A, B, C do not participate in the formation of the third digits of degrees (see 5°).
From what follows the truth of FLT in the first case.

Proof of the second case of the FLT (A is multiple of n)

Let's assume that for co-prime natural numbers A [$=n^kA°$], B, C and a prime n>2

1°) $A^n+B^n-C^n=0$ and $C^n-B^n=(C-B)P$, where, as it is known [see viXra:1707.0410],

1.1°) $(C-B)_{[kn-1]}=0$, $P=P°n$, $A^n=n^{kn}A°^n$, $U=A+B-C=n^ku$ ($u'\neq0$, k>1).

1.2°) $C-A=b^n$, $B=bq$; $A+B=c^n$, $C=cr$; $q^n=Q$, $r^n=R$, $P°'=Q'=R'=1$;
the numbers A°, P°, n, b, q, c, r are co-prime.

2°) Consider the number $D=(A+B)^n-(C-B)^n-(C-A)^n$, where $(C-B)^n_{[k+2]}=0$, from here

2.1°) $D_{[k+2]}=[(A+B)^n-(C-B)^n-(C-A)^n+(A^n+B^n-C^n)]_{[k+2]}=\{[(A+B)^n-C^n]-[(C-A)^n-B^n]\}_{[k+2]}$, or

2.2°) $D_{[k+2]}=\{[c^n(c^{n-1}-r)V]-[b^n(b^{n-1}-q)W]\}_{[k+2]}$, where c'=b', $V_{[2]}=W_{[2]}=10$,
$(c^{n-1}-r)_{[k]}=(b^{n-1}-q)_{[k]}=0$, $(c^{n-1}-r)_{(k+1)}=(b^{n-1}-q)_{(k+1)}$ (since $[(A+B-C)/cn^k]'=[(A+B-C)/bn^k]'$, where c'=b') and therefore,

3°) $D_{[k+2]}=0$.

However after removing parenthesis in Newton's binomials in 2° and grouping the summands having equal powers into pairs, we can notice that all pairs end by k+2 zeroes and only the pair in

4°) $n^{k+1}A°C^{n-1}+n^{k+1}A°B^{n-1}$ ends by k+1 zeroes, because (k+2)-th digit is equal to (2A°)' (since the numbers C^{n-1} and B^{n-1} end by digit 1 – see SFT), which contradicts to 3°!

Thus FLT is verified.

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