Ternary balanced system of value

Ternary balanced system of value - it is non-standard positional numeral system. The base of power 3, but it differs from the usual ternary system that figures are $-1, 0, 1$. Since the use $-1$of a single digit is very uncomfortable, it usually takes a special designation. We agree to denote here minus one letter z.

For example, the number 5in the ternary system is balanced as written $1zz$, and the number -5- as $z11$. Ternary balanced system value allows you to record negative numbers without writing a single sign "minus". Balanced ternary system allows fractional numbers (eg, $1/3$written as 0.1).

Translation algorithm

Learn to translate numbers in balanced ternary system.

For this we must first convert the number in the ternary system.

It is clear that now we have to get rid of the numbers 2, which we note that $2 = 3 - 1$, ie we can replace the two in the current discharge on -1, while increasing next (ie to the left of it in the natural recording) on discharge 1. If we move from right to left on the record and perform the above operation (in this case in some discharges can overflow more 3, in this case, of course, "reset" extra triples in MSB), we arrive at a balanced ternary recording. As is easily seen, the same rule holds true for fractional numbers.

More gracefully above procedure can be described as follows. We take the number of ternary, we add to it an infinite number $\ldots 11111.11111 \ldots$, then the result of each digit subtract one (already without any hyphens).

Knowing now the translation algorithm of conventional balanced ternary system, we can easily implement the operations of addition, subtraction and division - simply reducing them to the corresponding operations on ternary unbalanced numbers.