



Task 5. «A broken cipher machine»

Mary works on a cipher machine that encrypts messages like this:

Step 1. It represents a message as the natural number $n = \overline{abcdef\dots}$;

Step 2. Then it sums all the digits in the number, $S_n = a + b + c + d + e + f + \dots$;

Step 3. It inverts the order of digits in the number n and gets the number $n' = \overline{\dots fedcba}$;

Step 4. As a result of the encryption the machine prints the number $m = n' + 2 \cdot S_n$.

But now the cipher machine is broken: sometimes it works correctly but sometimes it prints random numbers m .

After encryption of her secret number n Mary found out that the result is the power of two, $m = 2^k$ for some integer k .

Determine was it the correct encryption in this case?

