Problem I. Recurrences

Input: Standard
Output: Standard
Author(s): Eddy Cael Mamani Canaviri - Coderoad Bolivia

Ailin recently learned linear recurrences, but apparently not the right way. She can not solve a problem proposed by her father ...

Can you help her? She has the following system of recurrences:

$$A_n = 4 * A_{n-1} - 3 * B_{n-1} - 3 * C_{n-1}$$
$$B_n = 5 * A_{n-1} - 4 * B_{n-1} - 4 * C_{n-1}$$
$$C_n = B_{n-1} - A_{n-1}$$

And she needs to calculate the value of $S(n)$ defined as follows:

$$S(n) = \begin{cases} 0 & if \quad n = 0 \\ S(n-1) + A_n + B_n + C_n & if \quad n \geq 1 \end{cases}$$

She knows that there is a method to calculate this result quickly, but she is something lazy and asks you for help to find the answers.

Input

The entry contains a number T, the number of test cases ($1 \leq T \leq 5 * 10^5$). Each of the following T lines contain an integer n ($1 \leq n \leq 9 * 10^{18}$) and the values of A_0, B_0, C_0 ($0 \leq A_0,\ B_0,\ C_0 \leq 9$).

Output

The output will contain T lines, each with the value of $S(n)$ defined above. Since the sum can be very large, print only the last digit. More formally, in each case print a no negative number, the result modulo 10.

Remember that if $a\ mod\ M < 0$ then you should add M to the result, so the answer is no negative. More formally you can use: $((a\ mod\ M) + M)\ mod\ M$

Example

Input	Output
5 1 1 2 3 4 1 2 3 7 1 2 3 100001 1 2 1 900000 1 2 9	5 1 7 8 0

Use fast I/O methods