UVa Online Judge

13136 Recurrences

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:

$$\begin{aligned} A_n &= 4{*}A_{n-1} - 3{*}B_{n-1} - 3{*}C_{n-1} \\ B_n &= 5{*}A_{n-1} - 4{*}B_{n-1} - 4{*}C_{n-1} \\ C_n &= B_{n-1} - A_{n-1} \end{aligned}$$

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

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

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

Sample Input

```
5
1 1 2 3
4 1 2 3
7 1 2 3
100001 1 2 1
900000 1 2 9
```

Sample Output

```
5
1
7
8
0
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