Project Euler #230: Fibonacci Words

This problem is a programming version of Problem 230 from projecteuler.net

For any two strings of digits, A and B, we define $F_{A,B}$ to be the sequence (A, B, AB, BAB, $ABBAB$, ...) in which each term is the concatenation of the previous two.

Further, we define $D_{A,B}(n)$ to be the n-th digit in the first term of $F_{A,B}$ that contains at least n digits.

Example:

Let $A = 1415926535$, $B = 8979323846$. We wish to find $D_{A,B}(35)$, say.

The first few terms of $F_{A,B}$ are:

- 1415926535
- 8979323846
- 14159265358979323846
- 897932384614159265358979323846
- 1415926535897932384689793238461415926535 8979323846

Then $D_{A,B}(35)$ is the 35-th digit in the fifth term, which is 9.

You are given q triples (A, B, n). For all of them find $D_{A,B}(n)$.

Input Format

First line of each test file contains a single integer q that is the number of triples. Then q lines follow, each containing two strings of decimal digits a and b and positive integer n.

Constraints

- $1 \le q \le 100$
- $1 \le length(a), length(b) \le 100$
- $1 \le n \le 2^{100}$

Output Format

Print exactly q lines with a single decimal digit on each: value of $D_{A,B}(n)$ for the corresponding triple.

Sample Input 0

```
2
1415926535 8979323846 35
141592653589793238462643383279502884197169399375105820974944592307816406286208998628034825342117067 9
```

```
82148086513282306647093844609550582231725359408128481117450284102701938521105559644622948954930381 96
104683731294243150
```

Sample Output 0

```
9
8
```