

Let's define another number sequence, given by the following function:

$$\begin{aligned}f(0) &= a \\f(1) &= b \\f(n) &= f(n-1) + f(n-2), \quad n > 1\end{aligned}$$

When $a = 0$ and $b = 1$, this sequence gives the Fibonacci Sequence. Changing the values of a and b , you can get many different sequences. Given the values of a , b , you have to find the last m digits of $f(n)$.

Input

The first line gives the number of test cases, which is less than 10001. Each test case consists of a single line containing the integers a b n m . The values of a and b range in $[0, 100]$, value of n ranges in $[0, 1000000000]$ and value of m ranges in $[1, 4]$.

Output

For each test case, print the last m digits of $f(n)$. However, you should NOT print any leading zero.

Sample Input

```
4
0 1 11 3
0 1 42 4
0 1 22 4
0 1 21 4
```

Sample Output

```
89
4296
7711
946
```