



Strange Function

Problem Code: **ABX01**

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as well.

As New Year is approaching, Salik is studying functions in order to sharpen his math skills. Instead of regular functions, he is studying a strange function **F** which operates on non-negative integers. The value of **F(A)** is obtained by the following process:

- Compute the sum of digits of **A**; let's denote this sum by **S**.
- If **S** is a single-digit integer, then **F(A) = S**.
- Otherwise, **F(A) = F(S)**.

It's guaranteed that this process correctly defines the function **F**.

Since this problem was pretty straightforward, he invented a new problem: Given two integers **A** and **N**, compute **F(A^N)**. Can you help him solve this task?

Input

- The first line of the input contains a single integer **T** denoting the number of test cases. The description of **T** test cases follows.
- The first and only line of each test case contains two space-separated integers **A** and **N**.

Output

For each test case, print a single line containing one integer — the value of **F(A^N)**.

Constraints

- $1 \leq T \leq 10^5$
- $1 \leq A, N \leq 10^{18}$

Subtasks

Subtask #1 (10 points):

- $1 \leq N \leq 3$
- $1 \leq A \leq 10^5$

Subtask #2 (20 points):

- $1 \leq N \leq 100$
- $1 \leq A \leq 10^5$

Subtask #3 (70 points): original constraints

Example

My Submissions

[\(/LTIME55/status/ABX01,jackyone\)](/LTIME55/status/ABX01,jackyone)

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Successful Submissions



Input :

3
5 2
7 2
127 1

Output :

7
4
1

Explanation

Example case 1: $F(5 \cdot 5) = F(25) = F(2+5) = F(7) = 7$

Example case 2: $F(7 \cdot 7) = F(49) = F(4+9) = F(13) = F(1+3) = F(4) = 4$

Example case 3: $F(127) = F(1+2+7) = F(10) = F(1+0) = F(1) = 1$

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Date Added: 30-10-2017

Time Limit: 0.5 secs

Source Limit: 50000 Bytes

Languages: ADA, ASM, BASH, BF, C, CAML, CLOJ, CLPS, CPP 4.3.2, CPP 6.3, CPP14, CS2, D, ERL, FORT, FS, GO, HASK, ICK, ICON, JAVA, JS, kotlin, LISP clisp, LISP sbcl, LUA, NEM, NICE, NODEJS, PAS fpc, PAS gpc, PERL, PERL6, PHP, PIKE, PRLG, PYPY, PYTH, PYTH 3.5, RUBY, SCALA, SCM chicken, SCM guile, SCM qobi, ST, TCL, TEXT, WSPC

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