HQNP Incomputable

HQ9+ is an esoteric programming language specialized for certain tasks. For example, printing "Hello,world!" or writing a quine (a program that prints itself) couldn't be any simpler. Unfortunately, HQ9+ doesn't do very well in most other situations. This is why we have created our own variant of the language,HQ0-9+–INCOMPUTABLE?!.A HQ0-9+–INCOMPUTABLE?! program is a sequence of commands, written on one line without any whitespace (except for the trailing newline). The program can store data in two memory areas: the buffer, a string of characters, and the accumulator, an integer variable. Initially, the buffer is empty and the accumulator is set to 0. The value of the buffer after executing all the commands becomes the program's output.

HQ0-9+–INCOMPUTABLE?! supports the following commands:

command	description
h, H	appends helloworld to the buffer
q, Q	appends the program source code to the buffer (not including the trailing newline)
0-9	replaces the buffer with n copies of its old value – for example, '2' doubles the buffer
+	increments the accumulator
-	decrements the accumulator
i, I	increments the ASCII value of every character in the buffer
n, N	applies ROT13 to the letters and numbers in the buffer (for letters ROT13 preserves case; for digits we define ROT13$(d) = (d + 13) \bmod 10$)
c, C	swaps the case of every letter in the buffer; doesn't change other characters
o, O	removes all characters from the buffer such that their index, counted from the end, is a prime or a power of two (or both); the last character has index 1 (which is a power of 2)
m, M	sets the accumulator to the current buffer length
p, P	removes all characters from the buffer such that their index is a prime or a power of two (or both); the first character has index 1 (which is a power of 2)
u, U	converts the buffer to uppercase
t, T	sorts the characters in the buffer by their ASCII values
a, A	replaces every character in the buffer with its ASCII value in decimal (1–3 digits)
b, B	replaces every character in the buffer with its ASCII value in binary (exactly eight '0'/'1' characters)
l, L	converts the buffer to lowercase
e, E	translates every character in the buffer to l33t using the following table: ABCDEFGHIJKLMNOPQRSTUVWXYZ abcdefghijklmnopqrstuvwxyz 0123456789 48(03=6#|JXLM~09Q257UVW%Y2 a6<d3f9hijk1m^0p9r57uvw*y2 O!ZEA$G/B9
?	removes 47 characters from the end of the buffer (or everything if it is too short)
!	removes 47 characters from the beginning of the buffer (or everything if it is too short)

In this task you have to print the HQ0-9+–INCOMPUTABLE?! program that will give the number n as output.

Limits

Any HQ0-9+–INCOMPUTABLE?! program(output for each case) must be at most 10 000 commands long. The accumulator is unbounded (it can store an arbitrarily large integer). After each command, the buffer must be at most 10 000 characters long. To prevent code injection vulnerabilities, during the execution of your program(output for each case) the buffer must never contain non-alphanumeric characters, i.e. characters other than A-Z, a-z, and 0-9. If it happens, your solution will be judged as wrong.

Input

First line has integer T i.e number of test cases. (T <= 100). Next T lines has a number n. (0 <= n <= 10^100)

Output

For each n, output the required HQ0-9+–INCOMPUTABLE?! program which will give n as output. If there are multiple solutions, output any one of them. Output of each test case must be in a single line.

Example

Input:

3

0

321

4124144

Output:

Find yourself :)

Following are some HQ0-9+–INCOMPUTABLE?! programs and their corresponding outputs:

h5!	rld
QCq	qcQQCq
q23	q23q23q23q23q23q23
h?h	helloworld

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H2O      hlwolheo
h4op     ollwldwlhe
hint     ccfkrsvzzz
q18N     d41Ad41Ad41Ad41Ad41Ad41Ad41Ad41A
3QAh     518165104helloworld
Qb       0101000101100010
opaque   094QU3
h1Qt     1Qdehhllloortw
H9999    (error: buffer size exceeded 10  000)
quine    (error: buffer contains "|")
LMAO     (empty output)
```