

Round A APAC Test 2016

A. Googol String

[B. gCube](#)

[C. gCampus](#)

[D. gSnake](#)

[Questions asked](#)

Submissions

Googol String

7pt	Not attempted 2083/5209 users correct (40%)
12pt	Not attempted 957/1730 users correct (55%)

gCube

8pt	Not attempted 1557/2234 users correct (70%)
16pt	Not attempted 855/1488 users correct (57%)

gCampus

10pt	Not attempted 493/1232 users correct (40%)
15pt	Not attempted 227/482 users correct (47%)

gSnake

13pt	Not attempted 121/629 users correct (19%)
19pt	Not attempted 41/88 users correct (47%)

Top Scores

cebrusfs	100
sgtlaugh	100
usaxena95	100
akovski	100
NAFIS	100
liuyibo1994	100
dtlyfc	100
Legendks	100
Shaon	100
jki14	100

Problem A. Googol String

This contest is open for practice. You can try every problem as many times as you like, though we won't keep track of which problems you solve. Read the [Quick-Start Guide](#) to get started.

Small input
7 points

Solve A-small

Large input
12 points

Solve A-large

Problem

A "0/1 string" is a string in which every character is either 0 or 1. There are two operations that can be performed on a 0/1 string:

- **switch**: Every 0 becomes 1 and every 1 becomes 0. For example, "100" becomes "011".
- **reverse**: The string is reversed. For example, "100" becomes "001".

Consider this infinite sequence of 0/1 strings:

$S_0 = ""$

$S_1 = "0"$

$S_2 = "001"$

$S_3 = "0010011"$

$S_4 = "001001100011011"$

...

$S_N = S_{N-1} + "0" + \text{switch}(\text{reverse}(S_{N-1}))$.

You need to figure out the K th character of S_{googol} , where $\text{googol} = 10^{100}$.

Input

The first line of the input gives the number of test cases, T . Each of the next T lines contains a number K .

Output

For each test case, output one line containing "Case #x: y", where x is the test case number (starting from 1) and y is the K th character of S_{googol} .

Limits

$1 \leq T \leq 100$.

Small dataset

$1 \leq K \leq 10^5$.

Large dataset

$1 \leq K \leq 10^{18}$.

Sample

Input	Output
4	Case #1: 0
1	Case #2: 0
2	Case #3: 1
3	Case #4: 0
10	

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