

USA Computing Olympiad

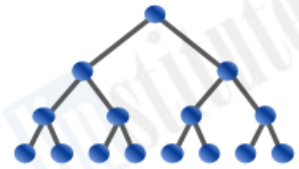
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Contest has ended.

USACO 2024 DECEMBER CONTEST, BRONZE PROBLEM 1. ROUNDABOUT ROUNDING

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English (en) ▾

Bessie the cow is back in school! She has started doing her math homework in which she is tasked to round positive integers to powers of 10.

To round a positive integer a to the nearest 10^b , where b is a positive integer, Bessie first locates the b 'th digit from the right. Let x denote this digit.

If $x \geq 5$, Bessie adds 10^b to a .

Then, Bessie sets all the digits including and to the right of the b 'th digit from the right to be 0.

For instance, if Bessie wanted to round 456 to the nearest 10^2 (hundred), Bessie would first locate the 2nd digit from the right which is 5. This means $x = 5$. Then since $x \geq 5$, Bessie adds 100 to a . Finally, Bessie sets all the digits in a to the right of and including the 2nd digit from the right to be 0, resulting in 500.

However, if Bessie were to round 446 to the nearest 10^2 , she would end up with 400.

After looking at Bessie's homework, Elsie thinks she has invented a new type of rounding: chain rounding. To chain round to the nearest 10^b , Elsie will first round to the nearest 10^1 , then the nearest 10^2 , and so on until the nearest 10^b .

Bessie thinks Elsie is wrong, but is too busy with math homework to confirm her suspicions. She tasks you to count how many integers x at least 2 and at most N ($1 \leq N \leq 10^9$) exist such that rounding x to the nearest 10^P is different than chain rounding to the nearest 10^P , where P is the smallest integer such that $10^P \geq x$.

INPUT FORMAT (input arrives from the terminal / stdin):

You have to answer multiple test cases.

The first line of input contains a single integer T ($1 \leq T \leq 10^5$) denoting the number of test cases. T test cases follow.

The first and only line of input in every test case contains a single integer N . All N within the same input file are guaranteed to be distinct.

OUTPUT FORMAT (print output to the terminal / stdout):

Output T lines, the i 'th line containing the answer to the i 'th test case. Each line should be an integer denoting how many integers at least 2 and at most N exist that are different when using the two rounding methods.

SAMPLE INPUT:

```
4
1
100
4567
3366
```

SAMPLE OUTPUT:

```
0
5
183
60
```

Consider the second test case in the sample. 48 should be counted because 48 chain rounded to the nearest 10^2 is 100 ($48 \rightarrow 50 \rightarrow 100$), but 48 rounded to the nearest 10^2 is 0.

In the third test case, two integers counted are 48 and 480. 48 chain rounds to 100 instead of to 0 and 480 chain rounds to 1000 instead of 0. However, 67 is not counted since it chain rounds to 100 which is 67 rounded to the nearest 10^2 .

SCORING:

- Inputs 2-4: $N < 10^3$

- Inputs 5-7: $N \leq 10^6$
- Inputs 8-13: No additional constraints.

Problem credits: Weiming Zhou

Contest has ended. No further submissions allowed.