Project Euler #112: Bouncy numbers

This problem is a programming version of Problem 112 from projecteuler.net

Working from left-to-right if no digit is exceeded by the digit to its left it is called an increasing number; for example, 134468.

Similarly if no digit is exceeded by the digit to its right it is called a decreasing number; for example, 66420.

We shall call a positive integer that is neither increasing nor decreasing a "bouncy" number; for example, 155349.

Clearly there cannot be any bouncy numbers below one-hundred, but just over half of the numbers below one-thousand (525) are bouncy. In fact, the least number for which the proportion of bouncy numbers first reaches 50% is 538.

Surprisingly, bouncy numbers become more and more common and by the time we reach 21780 the proportion of bouncy numbers is equal to 90%.

Find the least number for which the proportion of bouncy numbers is at least $\frac{n}{m}$.

Input Format

First line contains an integer T denoting the number of test cases.
Each of the following T lines contain two integers n and m.

Constraints

$1 \leq T \leq 10^4$
$1 \leq n < m \leq 10^{18}$

Output Format

For each of T test cases print one line containing a single integer - the answer to a problem.

Sample Input

```
2
1 2
90 100
```

Sample Output

```
538
21780
```