

# 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
```