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Day 6: Bitwise Operators ★

Problem

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Objective

Today, we're practicing bitwise operations. Check the attached tutorial for more details.

We define S to be a sequence of distinct sequential integers from 1 to n; in other words, $S=\{1,2,3,\ldots,n\}$. We want to know the maximum bitwise AND value of any two integers, $m{a}$ and $m{b}$ (where $m{a} < m{b}$), in sequence $m{S}$ that is also less than a given integer, $m{k}$.

Complete the function in the editor so that given \pmb{n} and \pmb{k} , it returns the maximum $\pmb{a} \ \pmb{\&} \ \pmb{b} < \pmb{k}$.

Note: The & symbol represents the bitwise AND operator.

Input Format

The first line contains an integer, q, denoting the number of function calls.

Each of the $m{q}$ subsequent lines defines a dataset for a function call in the form of two space-separated integers describing the respective values of $m{n}$ and $m{k}$.

Constraints

- $1 \le q \le 10^3$
- $2 \le n \le 10^3$
- $2 \le k \le n$

Output Format

Return the maximum possible value of $a \And b < k$ for any a < b in sequence S.

Sample Input 0

3

5 2

Sample Output 0

1

4 0

Explanation 0

We perform the following $oldsymbol{q}=\mathbf{3}$ function calls:

1. When n=5 and k=2, we have the following possible a and b values in set $S=\{1,2,3,4,5\}$:

a	b	a & b
1	2	$001 \& 010 = (000)_2 \Rightarrow (0)_{10}$
1	3	$001 \& 011 = (001)_2 \Rightarrow (1)_{10}$
1	4	$001 \& 100 = (000)_2 \Rightarrow (0)_{10}$
1	5	$001 \& 101 = (001)_2 \Rightarrow (1)_{10}$
2	3	$010 \& 011 = (010)_2 \Rightarrow (2)_{10}$

2 2	b 4	$\begin{array}{c} a \& b \\ -010 \& 100 = (000)_2 \Rightarrow (0)_{10} \end{array}$
2	5	$010 \& 101 = (000)_2 \Rightarrow (0)_{10}$
3	4	$011 \& 100 = (000)_2 \Rightarrow (0)_{10}$
3	5	$011 \& 101 = (001)_2 \Rightarrow (1)_{10}$
4	5	$100 \& 101 = (100)_2 \Rightarrow (4)_{10}$

The maximum of any $\boldsymbol{a} \ \boldsymbol{k} \ \boldsymbol{b}$ that is also $\boldsymbol{k} \ \boldsymbol{k}$ is $\boldsymbol{1}$, so we return $\boldsymbol{1}$.

- 2. When n=8 and k=5, the maximum of any $a \ \& \ b < k$ in set $S=\{1,2,3,4,5,6,7,8\}$ is 4 (see table above), so we return 4.
- 3. When n=2 and k=2, the maximum of any $a \ b < k$ in set $S=\{1,2\}$ is 0 (see table above), so we return 0.

Sample Input 1

```
2
9 2
```

8 3

Sample Output 1

1 2

Explanation 1

We perform the following q=2 function calls:

- 1. When n=9 and k=2, the maximum of any $a \ \& \ b < k$ in set $S=\{1,2,3,4,5,6,7,8,9\}$ is 1 (see table above), so we return 1.
- 2. When n=8 and k=3, the maximum of any $a \ \& \ b < k$ in set $S=\{1,2,3,4,5,6,7,8\}$ is 2 (see table above), so we return 2.

```
Change Theme Language: JavaScript (Node.js) 57 65
19
    });
20
     function readLine() {
21
         return inputString[currentLine++];
22
23
    }
24
25
     function getMaxLessThanK(n,k)
26
         var max = 0
27
28
         for(var i=1;i<n;i++)</pre>
29
         for(var j=i+1;j<=n;j++)</pre>
30
             var and = i&j
31
32
33
              if(and<k && and>max)
34
                  max=and
35
36
         return max
37
     }
38
     function main() {
39
40
         const q = +(readLine());
41
         for (let i = 0 · i < a · i++) {
                                                                                                               Line: 36 Col: 15
```

 $oldsymbol{1}$ Upload Code as File $oxedsymbol{\square}$ Test against custom input

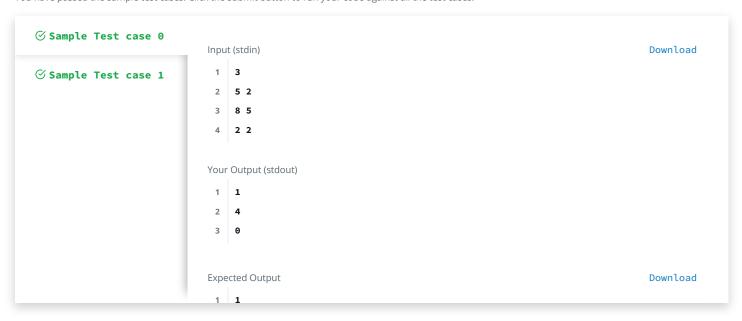
Dun Codo

Submit Codo

Kuii Coue Submit Coue

Congratulations!

You have passed the sample test cases. Click the submit button to run your code against all the test cases.



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