

[Basic Programming Challenges](#)

Bitwise AND



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Problem

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Tutorial

Given set $S = \{1, 2, 3, \dots, N\}$. Find two integers, A and B (where $A < B$), from set S such that the value of $A \& B$ is the maximum possible and also less than a given integer, K . In this case, $\&$ represents the bitwise AND operator.

Input Format

The first line contains an integer, T , the number of test cases.

Each of the T subsequent lines defines a test case as 2 space-separated integers, N and K , respectively.

Constraints

- $1 \leq T \leq 10^3$
- $2 \leq N \leq 10^3$
- $2 \leq K \leq N$

Output Format

For each test case, print the maximum possible value of $A \& B$ on a new line.

Sample Input

```
3
5 2
8 5
2 2
```

Sample Output

```
1
4
0
```

Explanation

$N = 5, K = 2, S = \{1, 2, 3, 4, 5\}$

All possible values of A and B are:

- $A = 1, B = 2; A \& B = 0$
- $A = 1, B = 3; A \& B = 1$
- $A = 1, B = 4; A \& B = 0$
- $A = 1, B = 5; A \& B = 1$
- $A = 2, B = 3; A \& B = 2$
- $A = 2, B = 4; A \& B = 0$

7. $A = 2, B = 5; A \& B = 0$
8. $A = 3, B = 4; A \& B = 0$
9. $A = 3, B = 5; A \& B = 1$
10. $A = 4, B = 5; A \& B = 4$

The maximum possible value of $A \& B$ that is also $< (K = 2)$ is **1**, so we print **1** on a new line.

[f](#) [t](#) [in](#)

Submissions: 5728



Max Score: 20



Difficulty: Easy

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★★★★★ Thanks!

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Current Buffer (saved locally, editable)  

C#  

```
1 using System;
2 using System.Collections.Generic;
3 using System.IO;
4 using System.Linq;
5 class Solution {
6
7     static void Main(String[] args) {
8         int t = Convert.ToInt32(Console.ReadLine());
9         for (int a0 = 0; a0 < t; a0++)
10         {
11             string[] tokens_n = Console.ReadLine().Split(' ');
12             int n = Convert.ToInt32(tokens_n[0]);
13             int k = Convert.ToInt32(tokens_n[1]);
14
15
16             int max_bit = 0;
17             for (int i = 1; i < n; i++)
18             {
19                 for (int j = i + 1; j <= n; j++)
20                 {
21                     int bitwise = i & j;
22
23                     if (bitwise > max_bit && bitwise < k)
24                     {
25                         max_bit = bitwise;
26                     }
27                 }
28             }
29
30             Console.WriteLine(max_bit);
31
32         }
33     }
34 }
35
36
```

Line: 33 Col: 14

 [Upload Code as File](#)

☐ Test against custom input

Run Code

Submit Code

Congrats, you solved this challenge!

✓ Test Case #0

✓ Test Case #1

✓ Test Case #2

✓ Test Case #3

✓ Test Case #4

✓ Test Case #5

Next Challenge

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