

Day 29: Bitwise AND

Objective

Welcome to the last day! Today, we're discussing bitwise operations. Check out the [Tutorial](#) tab for learning materials and an instructional video!

Task

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:

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

6. $A = 2, B = 4; A \& B = 0$
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.