Bitwise AND

HackerRank

Given set $S = \{1, 2, 3, \ldots, N\}$. 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

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

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

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

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