

Bitwise Operators



Objective

This challenge will let you learn about bitwise operators in C.

Inside the CPU, mathematical operations like addition, subtraction, multiplication and division are done in bit-level. To perform bit-level operations in C programming, bitwise operators are used which are explained below.

- **Bitwise AND operator &** The output of bitwise AND is 1 if the corresponding bits of two operands is 1 . If either bit of an operand is 0 , the result of corresponding bit is evaluated to 0 . It is denoted by $\&$.
- **Bitwise OR operator |** The output of bitwise OR is 1 if at least one corresponding bit of two operands is 1 . It is denoted by $|$.
- **Bitwise XOR (exclusive OR) operator ^** The result of bitwise XOR operator is 1 if the corresponding bits of two operands are opposite. It is denoted by \oplus .

For example, for integers 3 and 5,

```
3 = 00000011 (In Binary)
5 = 00000101 (In Binary)

AND operation      OR operation      XOR operation
00000011          00000011          00000011
& 00000101        | 00000101        ^ 00000101
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00000001 = 1      00000111 = 7      00000110 = 6
```

Task

Given set $S = \{1, 2, 3, \dots, n\}$, find:

- the maximum value of $a \& b$ which is less than a given integer k , where a and b (where $a < b$) are two integers from set S .
- the maximum value of $a | b$ which is less than a given integer k , where a and b (where $a < b$) are two integers from set S .
- the maximum value of $a \oplus b$ which is less than a given integer k , where a and b (where $a < b$) are two integers from set S .

Input Format

The only line contains 2 space-separated integers, n and k , respectively.

Constraints

- $2 \leq n \leq 10^3$
- $2 \leq k \leq n$

Output Format

- The first line of output contains the maximum possible value of $a \& b$.
- The second line of output contains the maximum possible value of $a | b$.
- The second line of output contains the maximum possible value of $a \oplus b$.

Sample Input 0

Sample Output 0

```
2
3
3
```

Explanation 0

$$n = 5, k = 4$$

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

All possible values of a and b are:

1. $a = 1, b = 2; a \& b = 0; a | b = 3; a \oplus b = 3;$
2. $a = 1, b = 3; a \& b = 1; a | b = 3; a \oplus b = 2;$
3. $a = 1, b = 4; a \& b = 0; a | b = 5; a \oplus b = 5;$
4. $a = 1, b = 5; a \& b = 1; a | b = 5; a \oplus b = 4;$
5. $a = 2, b = 3; a \& b = 2; a | b = 3; a \oplus b = 1;$
6. $a = 2, b = 4; a \& b = 0; a | b = 6; a \oplus b = 6;$
7. $a = 2, b = 5; a \& b = 0; a | b = 7; a \oplus b = 7;$
8. $a = 3, b = 4; a \& b = 0; a | b = 7; a \oplus b = 7;$
9. $a = 3, b = 5; a \& b = 1; a | b = 7; a \oplus b = 6;$
10. $a = 4, b = 5; a \& b = 4; a | b = 5; a \oplus b = 1;$
 - The maximum possible value of $a \& b$ that is also $< (k = 4)$ is **2**, so we print **2** on first line.
 - The maximum possible value of $a | b$ that is also $< (k = 4)$ is **3**, so we print **3** on second line.
 - The maximum possible value of $a \oplus b$ that is also $< (k = 4)$ is **3**, so we print **3** on third line.