

Contest Duration: 2025-09-27(Sat) 22:00 (<http://www.timeanddate.com/worldclock/fixedtime.html?iso=20250927T2100&p1=248>) - 2025-09-27(Sat) 23:40 (<http://www.timeanddate.com/worldclock/fixedtime.html?iso=20250927T2240&p1=248>) (local time) (100 minutes)

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## G - Sum of Min of XOR

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Time Limit: 2.5 sec / Memory Limit: 1024 MiB

Score : 575 points

### Problem Statement

You are given positive integers  $N$ ,  $M$  and a sequence of non-negative integers  $A = (A_1, A_2, \dots, A_N)$  of length  $N$ .

$$\text{Find } \sum_{x=0}^{M-1} \min_{1 \leq i \leq N} (x \oplus A_i).$$

Here,  $x \oplus A_i$  represents the bitwise XOR of  $x$  and  $A_i$ .

► What is bitwise XOR operation?

### Constraints

- $1 \leq N \leq 2 \times 10^5$
- $1 \leq M \leq 10^9$
- $0 \leq A_i \leq 10^9$
- All input values are integers.

### Input

The input is given from Standard Input in the following format:

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$N \quad M$   
 $A_1 \quad A_2 \quad \dots \quad A_N$

## Output

Output the answer.

### Sample Input 1

Copy

2 4  
1 2

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### Sample Output 1

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2

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- When  $x = 0$ :  $x \oplus A_1 = 1, x \oplus A_2 = 2$ , so  $\min_{1 \leq i \leq N} (x \oplus A_i) = 1$ .
- When  $x = 1$ :  $x \oplus A_1 = 0, x \oplus A_2 = 3$ , so  $\min_{1 \leq i \leq N} (x \oplus A_i) = 0$ .
- When  $x = 2$ :  $x \oplus A_1 = 3, x \oplus A_2 = 0$ , so  $\min_{1 \leq i \leq N} (x \oplus A_i) = 0$ .
- When  $x = 3$ :  $x \oplus A_1 = 2, x \oplus A_2 = 1$ , so  $\min_{1 \leq i \leq N} (x \oplus A_i) = 1$ .

Therefore, output  $1 + 0 + 0 + 1 = 2$ .

### Sample Input 2

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6 5  
0 1 2 3 4 5

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### Sample Output 2

Copy

0

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### Sample Input 3

Copy

10 8762  
347 883 264 816 533 306 190 880 624 279

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## Copy

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