

Ada and Mold

As you might already know, Ada the Ladybug is a farmer. She has a long furrow in which she grows vegetable (while each vegetable is identified by a bloom-value). The more vegetable is in the furrow the bigger risk of mold there is. More specifically the mold-value can be obtained as sum of **xor** of all pairs of vegetable's bloom-values.

Ada has bought a few wooden separators which could possibly reduce the mold-value. It works in following manner: she can put the separators between some plants, dividing the furrow into multiple segments. The mold-value will then becomes the sum of mold-values of all the segments (independently). Can you find the minimal possible mold-value?

Input

The first line of input contains two integers **N, K**: $1 \leq K < N \leq 5000$, the length of furrows and the number of separators.

The next lines will contain **N** numbers $0 \leq A_i \leq 10^9$, the bloom-values of vegetable.

Output

Output the minimal possible mold-value.

Example Input

```
6 1
1 2 3 4 5 6
```

Example Output

```
12
```

Example Input 1

```
4 3
5 3 5 3
```

Example Output 1

```
0
```

Example Input 2

```
7 2
5 3 5 3 5 3 4
```

Example Output21

```
24
```

Example Input 3

```
9 4
1 2 3 4 5 6 7 666 1024
```

Example Output 3

```
8
```

Example Input 4

```
30 8
629470789 417274987 617986533 841737683 297969800 432044389 708142005 156958893 499363651 434034331 176735187 525172817 747109631 949700868 259681519 357968078 818249
```

Example Output 4

```
16154467281
```