

Problem 4 - \mathfrak{P} Ring (Programming) (13 points)

Problem Description

Under the rule of King \mathfrak{P} , people live from hand to mouth in the kingdom of \mathfrak{P} . In the time of crisis, people rose to rebel and used a ring to seal King \mathfrak{P} .

To ensure everyone's safety, people decided to divide the ring into M segments and hide them at the end of the earth to prevent \mathfrak{P} from resurrecting and slaughtering the people.

This ring is decorated by N symbols, and each can be represented by a value a_1, a_2, \dots, a_N , in counterclockwise order. After dividing the ring into M segments (each consisting of some consecutive symbols), we can calculate each segment's risk value as follows.

Suppose the symbols within a segment can be represented as b_1, b_2, \dots, b_k , the risk value of this segment will be

$$\sum_{i=1}^k b_i - \sum_{i=1}^{k-1} |b_{i+1} - b_i| + \sum_{i=1}^{k-2} b_{i+1} \times ((b_i \& b_{i+1}) \oplus (b_{i+1} | b_{i+2}) \oplus (b_i + b_{i+2}))$$

, where $x \& y$ means applying bitwise AND operation, $x | y$ means applying bitwise OR operation, and $x \oplus y$ means applying bitwise XOR operation to numbers x and y .

To reduce the risk, you want to minimize the sum of the risk values of the M segments. How should you divide the M segments?

Input

The first line contains two integers N, M , representing the number of symbols on the ring and the number of segments to be divided.

The following contains N space-separated integers a_1, a_2, \dots, a_N , indicating the symbols on the ring.

- $2 \leq M \leq N \leq 1000$
- $0 \leq a_i \leq 10^5$

Test Group 0 (0 %)

- Sample Input.

Test Group 2 (30 %)

- $N \leq 100$

Test Group 1 (20 %)

- $N \leq 25$.

Test Group 3 (50 %)

- No additional constraint.

Output

Please print an integer representing the smallest sum of risk values of the M segments.

Sample Input 1

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

Sample Output 1

```
14
```

Sample Input 2

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

Sample Output 2

```
10
```

Sample Input 3

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

Sample Output 3

```
15
```

Hint

- The risk-value function has no specific meaning and you don't have to focus on it.
- You can check this [sample code](#) to see how to calculate the risk value.