Fair Cut

HackerRank

Li and Lu have n integers, $a_1, a_2, \ldots, a_n$, that they want to divide fairly between the two of them. They decide that if Li gets integers with indices $I = \{i_1, i_2, \ldots, i_k\}$ (which implies that Lu gets integers with indices $J = \{1, \ldots, n\} \setminus I$), then the measure of unfairness of this division is:

$$f(I) = \sum_{i \in I} \sum_{j \in J} |a_i - a_j|$$

Find the minimum measure of unfairness that can be obtained with some division of the set of integers where Li gets exactly k integers.

Note $A \setminus B$ means Set complement

Input Format

The first line contains two space-separated integers denoting the respective values of n (the number of integers Li and Lu have) and k (the number of integers Li wants).
The second line contains n space-separated integers describing the respective values of $a_1, a_2, \ldots, a_n$.

Constraints

- $1 \leq k < n \leq 3000$
- $1 \leq a_i \leq 10^9$
- For 15% of the test cases, $n \leq 20$.
- For 45% of the test cases, $n \leq 40$.

Output Format

Print a single integer denoting the minimum measure of unfairness of some division where Li gets k integers.

Sample Input 0

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

Sample Output 0

```
6
```

Explanation 0

One possible solution for this input is $I = \{2, 4\}$; $J = \{1, 3\}$.
$|a_2 - a_1| + |a_2 - a_3| + |a_4 - a_1| + |a_4 - a_3| = 1 + 2 + 2 + 1 = 6$

Sample Input 1

```
4 1
3 3 3 1
```

Sample Output 1

```
2
```

Explanation 1

The following division of numbers is optimal for this input: $I = \{1\}$; $J = \{2, 3, 4\}$.