Waterloo 2017 Fall C - Computer Science

Time limit: 1.0s **Memory limit:** 512M

2017 Fall Waterloo Local ACM Contest, Problem C

Vera has N integers $a_1, \ldots, a_N$. A *margin* is a non-negative integer L such that it is possible to choose N integers $x_1, \ldots, x_N$ such that for all i, $1 \leq i \leq N$, the interval $[x_i, x_i + L]$ contains at least K of Vera's integers and also contains a_i.

Compute the minimum possible margin.

Input

Line 1 contains integers N and K $(1 \leq K \leq N \leq 2 \times 10^5)$.

Line 2 contains N integers, $a_1, \ldots, a_N$ $(-10^9 \leq a_i \leq 10^9)$.

Output

Print one line with one integer, the minimum possible margin.

Sample Input

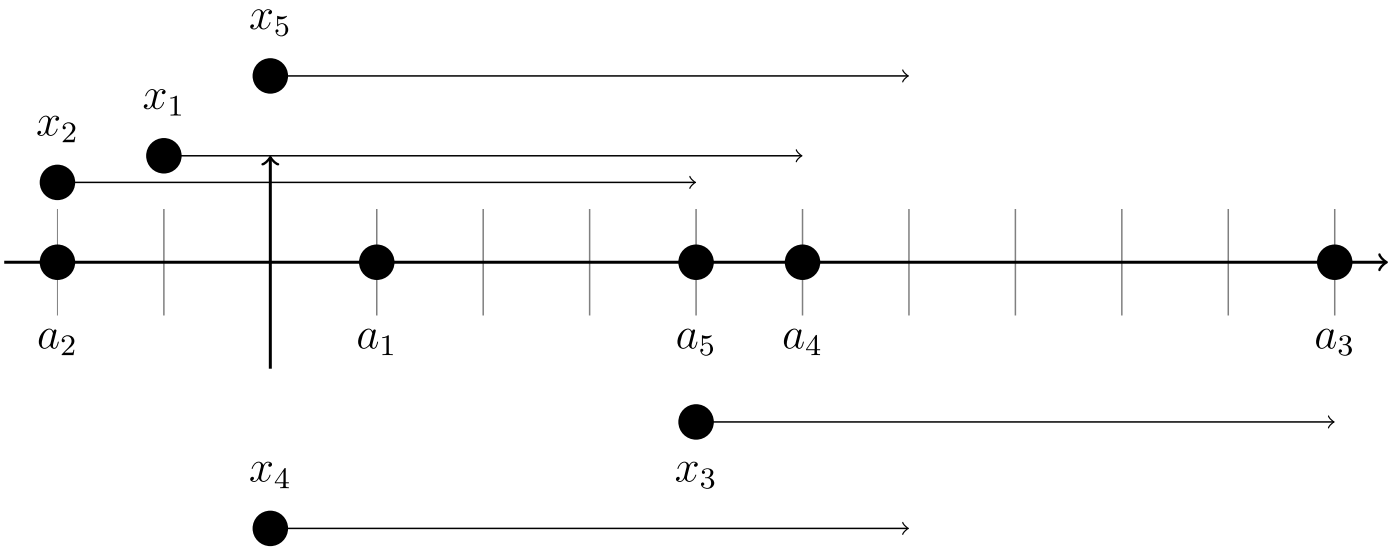
```
5 3
1 -2 10 5 4
```

Sample Output

```
6
```

Note

For the first example, one possible solution is to choose $x_1 = -1, x_2 = -2, x_3 = 4, x_4 = 0, x_5 = 0$, which is illustrated below.


x_5
x_1
x_2
a_2
a_1
a_5
a_4
a_3
x_3
x_4