



## Cake 3

Today is IOI-chan's birthday, so her brother JOI-kun pre-ordered her birthday cake. Though he planned to buy a whole cake, he mistakenly ordered  $N$  pieces of cake. They are numbered from 1 to  $N$  and each piece of cake has value and color. The value of the piece  $i$  ( $1 \leq i \leq N$ ) is  $V_i$  and the depth of its color is  $C_i$ .

In order to make a whole cake, he decided to choose  $M$  distinct pieces and to arrange them in a circular form in an arbitrary order. The beauty of the whole cake he makes is defined as

$$\sum_{j=1}^M V_{k_j} - \sum_{j=1}^M |C_{k_j} - C_{k_{j+1}}|$$

if he chooses the pieces  $k_1, \dots, k_M$  and arranges them in this order (here we set  $k_{M+1} = k_1$ ). In other words, the beauty of the whole cake is the sum of the values of its pieces minus the sum of the differences in the depth of the color between every two adjacent pieces. JOI-kun wants to make the whole cake as beautiful as possible.

Write a program which, given the number of pieces, the number of pieces needed to make a whole cake, the value and the depth of color for each piece, calculates the maximum beauty of a whole cake JOI-kun can make.

### Input

Read the following data from the standard input. All the values in the input are integers.

$N$   $M$   
 $V_1$   $C_1$   
:  
 $V_N$   $C_N$

### Output

Write one line to the standard output. The output should contain the maximum beauty of the whole cake JOI-kun can make.



## Constraints

- $3 \leq N \leq 200\,000$ .
- $3 \leq M \leq N$ .
- $1 \leq V_i \leq 1\,000\,000\,000$  ( $1 \leq i \leq N$ ).
- $1 \leq C_i \leq 1\,000\,000\,000$  ( $1 \leq i \leq N$ ).

## Subtask

1. (5 points)  $N \leq 100$ .
2. (19 points)  $N \leq 2000$ .
3. (76 points) No additional constraints.

## Sample Input and Output

Sample Input 1	Sample Output 1
5 3 2 1 4 2 6 4 8 8 10 16	6

If JOI-kun chooses the pieces 1, 3 and 2 and arranges them in this order, the sum of the values of its pieces is  $2 + 6 + 4 = 12$  and the sum of the differences in the depth of the color is  $|1 - 4| + |4 - 2| + |2 - 1| = 6$ . Thus, the beauty of the whole cake is  $12 - 6 = 6$ .

He can also make a whole cake with beauty 6 if he chooses the pieces 2, 3 and 4 and arrange them in this order.

Since he cannot make a more beautiful whole cake, you should output 6.



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Contest Day 4 – Cake 3

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入力例 2	出力例 2
8 4	2323231661
112103441 501365808	
659752417 137957977	
86280801 257419447	
902409188 565237611	
965602301 689654312	
104535476 646977261	
945132881 114821749	
198700181 915994879	