



2

Self Study

In the third semester of the first grade of JOI High School, N courses are given for M weeks from the first week to the M -th week. The courses are numbered from 1 to N . In each week, N classes are given. The i -th class in each week is a class for Course i .

Bitaro is a student of the first grade. In each of the $N \times M$ classes, he takes one of the following actions.

- Action 1: Bitaro attends the class. If he attends a class for Course i ($1 \leq i \leq N$), the comprehension level of Course i will be increased by A_i .
- Action 2: Bitaro does not attend the class. Instead, he chooses any one of the courses, and studies for the chosen course by himself. If he studies for Course i ($1 \leq i \leq N$) by himself for the duration of a class, the comprehension level of Course i will be increased by B_i .

In the beginning, the comprehension level of every course is 0. Since Bitaro wants to practice competitive programming after school, he will not study outside the duration of the classes. When all the classes in the third semester finish, the final examination will be held.

Bitaro does not want to get a failing grade. Therefore, he wants to maximize the minimum comprehension level of the courses at the moment of the final examination.

Given the length of the semester, the number of the courses, and the incremental values of the comprehension levels, write a program which calculates the maximum possible value of the minimum comprehension level of the courses at the moment of the final examination.

Input

Read the following data from the standard input. Given values are all integers.

```
 $N$   $M$   
 $A_1$   $A_2$   $\cdots$   $A_N$   
 $B_1$   $B_2$   $\cdots$   $B_N$ 
```

Output

Write one line to the standard output. The output should contain the maximum possible value of the minimum comprehension level of the courses at the moment of the final examination.



Constraints

- $1 \leq N \leq 300\,000$.
- $1 \leq M \leq 1\,000\,000\,000$.
- $1 \leq A_i \leq 1\,000\,000\,000$ ($1 \leq i \leq N$).
- $1 \leq B_i \leq 1\,000\,000\,000$ ($1 \leq i \leq N$).

Subtasks

1. (10 points) $M = 1$.
2. (25 points) $N \times M \leq 300\,000$, $A_i = B_i$ ($1 \leq i \leq N$).
3. (27 points) $N \times M \leq 300\,000$.
4. (29 points) $A_i = B_i$ ($1 \leq i \leq N$).
5. (9 points) No additional constraints.

Sample Input and Output

Sample Input 1	Sample Output 1
3 3 19 4 5 2 6 2	18

For example, if Bitaro studies in the following way, the comprehension level of Course 1, 2, 3 will be 19, 18, 19, respectively.

- In the first week, at the time of Course 1, he studies for Course 2 by himself.
- In the first week, at the time of Course 2, he studies for Course 2 by himself.
- In the first week, at the time of Course 3, he attends the class for Course 3.
- In the second week, at the time of Course 1, he attends the class for Course 1.
- In the second week, at the time of Course 2, he studies for Course 3 by himself.
- In the second week, at the time of Course 3, he attends the class for Course 3.
- In the third week, at the time of Course 1, he studies for Course 3 by himself.
- In the third week, at the time of Course 2, he studies for Course 2 by himself.
- In the third week, at the time of Course 3, he attends the class for Course 3.



Since the minimum comprehension level of the courses cannot be larger than or equal to 19, output 18.

This sample input satisfies the constraints of Subtasks 3, 5.

Sample Input 2	Sample Output 2
2 1	7
9 7	
2 6	

This sample input satisfies the constraints of Subtasks 1, 3, 5.

Sample Input 3	Sample Output 3
5 60000	41397427274960
630510219 369411957 874325200 990002527 567203997	
438920902 634940661 593780254 315929832 420627496	

This sample input satisfies the constraints of Subtasks 3, 5.

Sample Input 4	Sample Output 4
4 25	48
1 2 3 4	
1 2 3 4	

This sample input satisfies the constraints of Subtasks 2, 3, 4, 5.