Task 4: Arcade (`arcade`)

Emily the alien octopus is playing an arcade game. The game machine consists of N buttons, numbered 1 to N from left to right. The game involves pressing a series of M buttons, one per second. At T_i seconds from the start of the game, button A_i must be pressed. Note that it is possible for $T_i = T_j, A_i = A_j$ even if $i \neq j$.

Each of Emily's hands can start at any position at the start of the game, and it takes exactly one second for Emily to move a hand from a button to an adjacent button. Emily's hands can move simultaneously, and it takes no time to press a button. As alien octopuses have an infinite number of hands, it is always possible to obtain the maximum score on the game by completing all M button presses. However, as Emily is lazy, she does not want to use all her hands. Let the minimum number of hands required to obtain the maximum score be S.

Given the exact series of button presses Emily has to accomplish, help her find out the minimum number of hands she needs to use to obtain the maximum score for the game. Help find and provide Emily the value of S.

Input

Your program must read from standard input.

The first line contains two integers N and M.

The second line contains M integers, where the ith integer represents T_i.

The third line contains M integers, where the ith integer represents A_i.

Output

Your program must print to standard output.

The output should contain a single integer on a single line, the minimum number of hands Emily needs to use to obtain the maximum score for the game.

Implementation Note

As the input lengths for subtask 7 may be very large, you are recommended to use C++ with fast input routines to solve this problem. The scientific committee does not have a solution written in Java or Python that can fully solve this problem.

C++ and Java source files containing fast input/output templates have been provided in the attachment. You are strongly recommended to use these templates.

If you are implementing your solution in Java, please name your file `Arcade.java` and place your main function inside `class Arcade`.

Subtasks

The maximum execution time on each instance is 1.0s, and the maximum memory usage on each instance is 1GiB. For all testcases, the input will satisfy the following bounds:

- $1 \leq N \leq 10^9$

- $1 \leq M \leq 5 \times 10^5$

- $1 \leq A_i \leq N$

- $1 \leq T_i \leq 10^9$

Your program will be tested on input instances that satisfy the following restrictions:

Let the minimum number of hands required to obtain the maximum score be S.

Subtask	Marks	Additional Constraints
1	7	$1 \leq N, M, T_i \leq 100$ $1 \leq S \leq 2$
2	11	$1 \leq N, M, T_i \leq 100$ $1 \leq S \leq 3$
3	12	$1 \leq N, M, T_i \leq 100$ $1 \leq S \leq 4$
4	21	$1 \leq M \leq 300$
5	14	$1 \leq M \leq 15\,000$
6	20	$1 \leq M \leq 100\,000$
7	15	-

Sample Testcase 1

This testcase is valid for all subtasks.

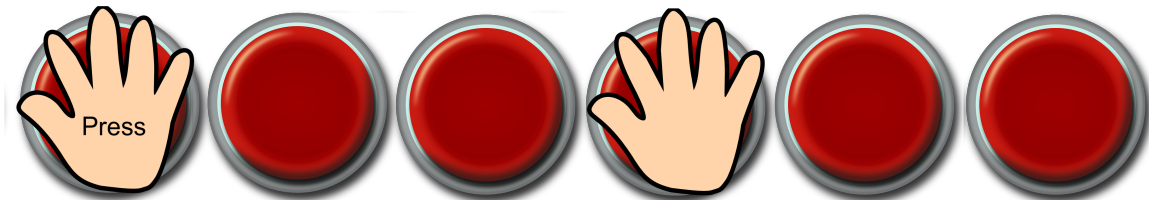| Input	Output
6 4	2
1 2 3 4	
3 1 2 6	

Sample Testcase 1 Explanation

At the start of the game, Emily's hands will be in the following positions, with her right hand pressing button 3:
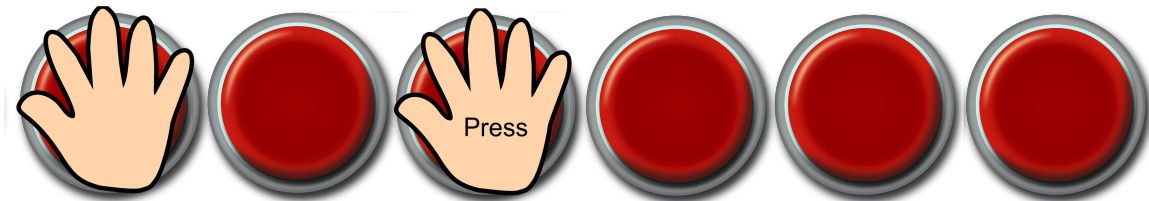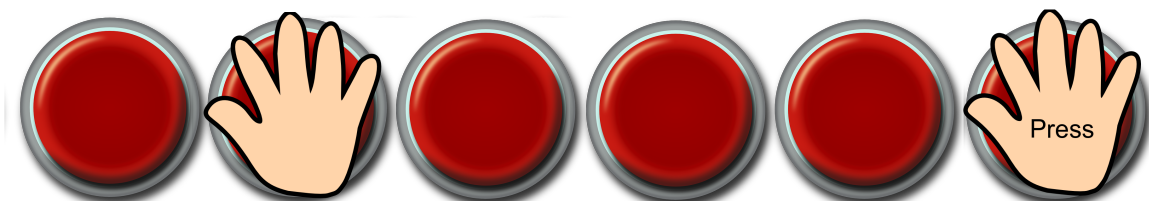

In the next second, Emily will move her right hand one button to the right, and press button 1 with her left hand.

After which, she will move both hands one button to the right simultaneously, and press button 2.
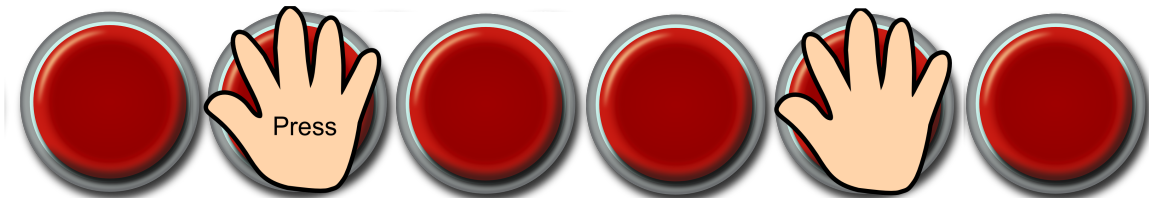
In the final second, she will move her right hand one step to the right and press button 6

Therefore, Emily would require **two** hands to complete the game. S would thus have the value of 2 and the program would output 2.