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Rotary Lock (Chapter 2)

Level 2   Time limit: 15s   Not started

Note: Chapter 1 is an easier version of this puzzle.

You're trying to open a lock. The lock comes with two wheels, each of which has the integers from 1 to N arranged in a circle in order around it (with integers 1 and N adjacent to one another). Each wheel is initially pointing at 1.

For example, the following depicts the lock for $N = 10$ (as is presented in the second sample case).

It takes 1 second to rotate a wheel by 1 unit to an adjacent integer in either direction, and it takes no time to select an integer once a wheel is pointing at it.

The lock will open if you enter a certain code. The code consists of a sequence of M integers, the ith of which is C_i. For each integer in the sequence, you may select it with either of the two wheels. Determine the minimum number of seconds required to select all M of the code's integers in order.

Constraints

$3 \le N \le 1{,}000{,}000{,}000$
$1 \le M \le 3{,}000$
$1 \le C_i \le N$

Sample test case #1

```
N = 3
M = 3
C = [1, 2, 3]
```
```
Expected Return Value = 2
```

Sample test case #2

```
N = 10
M = 4
C = [9, 4, 4, 8]
```
```
Expected Return Value = 6
```

Sample Explanation

In the first case, there are 3 integers on the locks, and the sequence of integers to be selected is $[1, 2, 3]$. One optimal way to enter the code is: select 1 on the first lock $\rightarrow$ rotate the first lock to 2 (1 second) $\rightarrow$ select 2 $\rightarrow$ rotate the second lock from 1 backwards to 3 (1 second) $\rightarrow$ select 3. The total time taken is $1 + 1 = 2$ seconds.

In the second case, the locks each consists of the integers 1 through 10, and the sequence to be selected is $[9, 4, 4, 8]$. One optimal way to enter the code is: rotate the first lock from 1 backwards to 9 (2 seconds) $\rightarrow$ select 9 $\rightarrow$ rotate the second lock forwards from 1 to 4 (3 seconds) $\rightarrow$ select 4 twice $\rightarrow$ rotate the first lock from 9 backwards to 8 (1 second) $\rightarrow$ select 8. The total time taken is $2 + 3 + 1 = 6$ seconds.

The code editor for solving puzzles is only available on wider screens.

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