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Weapon Boxes

— Problem Description

In the border of India, there is a military camp where soldiers stay. The soldiers need weapons during the wars and some weapons are made in India while the others are imported from other countries. One day many boxes of weapons arrived from different countries. These boxes have different numbers assigned to it. These numbers denotes the weight of the boxes. Larger the number on the box, the more will be the weapons inside it. All these boxes are arranged in a line starting from the camp. One day the commander wanted to test the weapons in all the boxes one by one. But he wanted to prioritize the boxes with more weight because when he open that box, the number of weapons will be more. So he will followed the below steps.

- He will carry this process in cycles. In each cycle, he will select the first *N* boxes. From those, every time he will pick the first two boxes and compare them and send the box with lower weight to the end of the line.
- At last one box will remain from those N boxes, then the cycle is said to be complete.
- He halts this process when the same box remains un-shifted to the end of the line in *K* consecutive cycles.
- For shifting these boxes, he hired labors and they will charge an amount which is equal to the sum of weights of all those boxes except those which are having triangular number weights.

Given an array consisting of weights of all the boxes, two integers N and K, print the amount of money that the commander have to give to workers.

— Constraints

1 <= weight of each box <= 10^5

1 <= number of boxes <= 10^4

1 <= N,K <= 10^3

All the elements in the array are distinct.

Input

First line consists of an array denoting the weight of all the boxes.

Second line consists of two space separated integers N and K, denoting the number of boxes he selects in each cycle and number of times a box should remain unshifted to halt the process.

Output

Print the amount of money that the commander have to give to workers.

Time Limit (secs)

1

Examples

Example 1

Input

7 3 6 9 10 2 4 11 5 12 17 1

3 2

Output

22

Explanation

In each cycle, we select 3 boxes and follow the below steps.

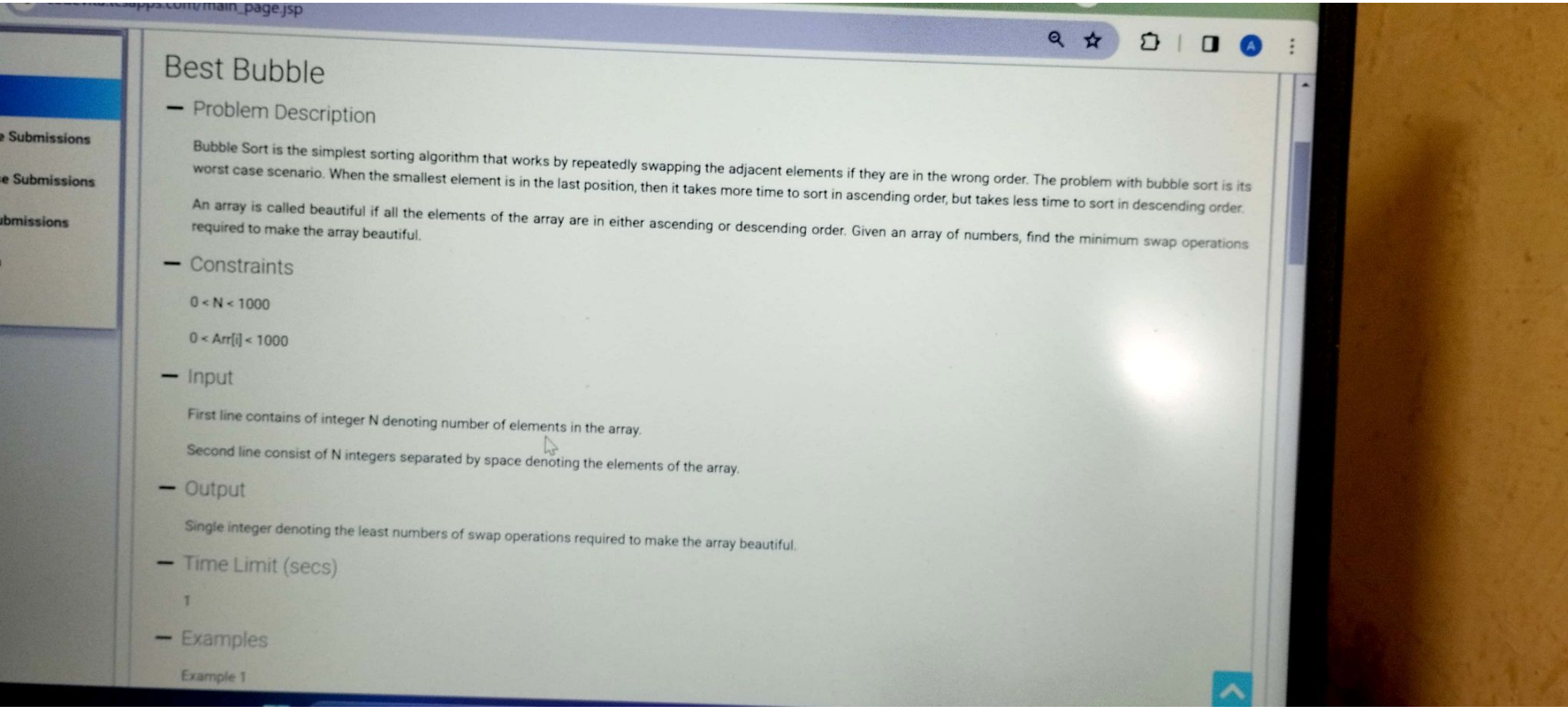
In each cycle, we select 3 boxes and follow the below steps.

Cycle number	Comparing numbers	Shifting box	Resulting Sequence
1	7,3	3	7 6 9 10 2 4 11 5 12 17 1 3
	7,6	6	7 9 10 2 4 11 5 12 17 1 3 6
2	7,9	7	9 10 2 4 11 5 12 17 1 3 6 7
	9,10	9	10 2 4 11 5 12 17 1 3 6 7 9
3	10,2	2	10 4 11 5 12 17 1 3 6 7 9
	10,4	4	10 11 5 12 17 1 3 6 7 9 2 4

After cycle 3, 10 remained un-shifted in 2 cycles. Hence he halts the process.

Total amount need to be paid for the labor = sum of non triangular weights of all the shifted boxes = 7 + 9 + 2 + 4 = 22

Example 2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Best Bubble
Problem Description
Bubble Sort is the simplest sorting algorithm that works by repeatedly swapping the adjacent elements if they are in the wrong order. The problem with bubble sort is its worst case scenario. When the smallest element is in the last position, then it takes more time to sort in ascending order, but takes less time to sort in descending order.
An array is called beautiful if all the elements of the array are in either ascending or descending order. Given an array of numbers, find the minimum swap operations required to make the array beautiful.
Constraints
0 < N < 1000
0 < Arr[i] < 1000
Input
First line contains of integer N denoting number of elements in the array.
Second line consist of N integers separated by space denoting the elements of the array.
Output
Single integer denoting the least numbers of swap operations required to make the array beautiful.
Time Limit (secs)
1
Examples
Example 1

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Input

5

4 5 3 2 1

Output

1

Explanation

The number of swaps required to sort the elements in ascending order is 9.

The number of swaps required to sort the elements in descending order is 1.

The best way is to sort in descending order and swaps required is 1.

Example 2

Input

5

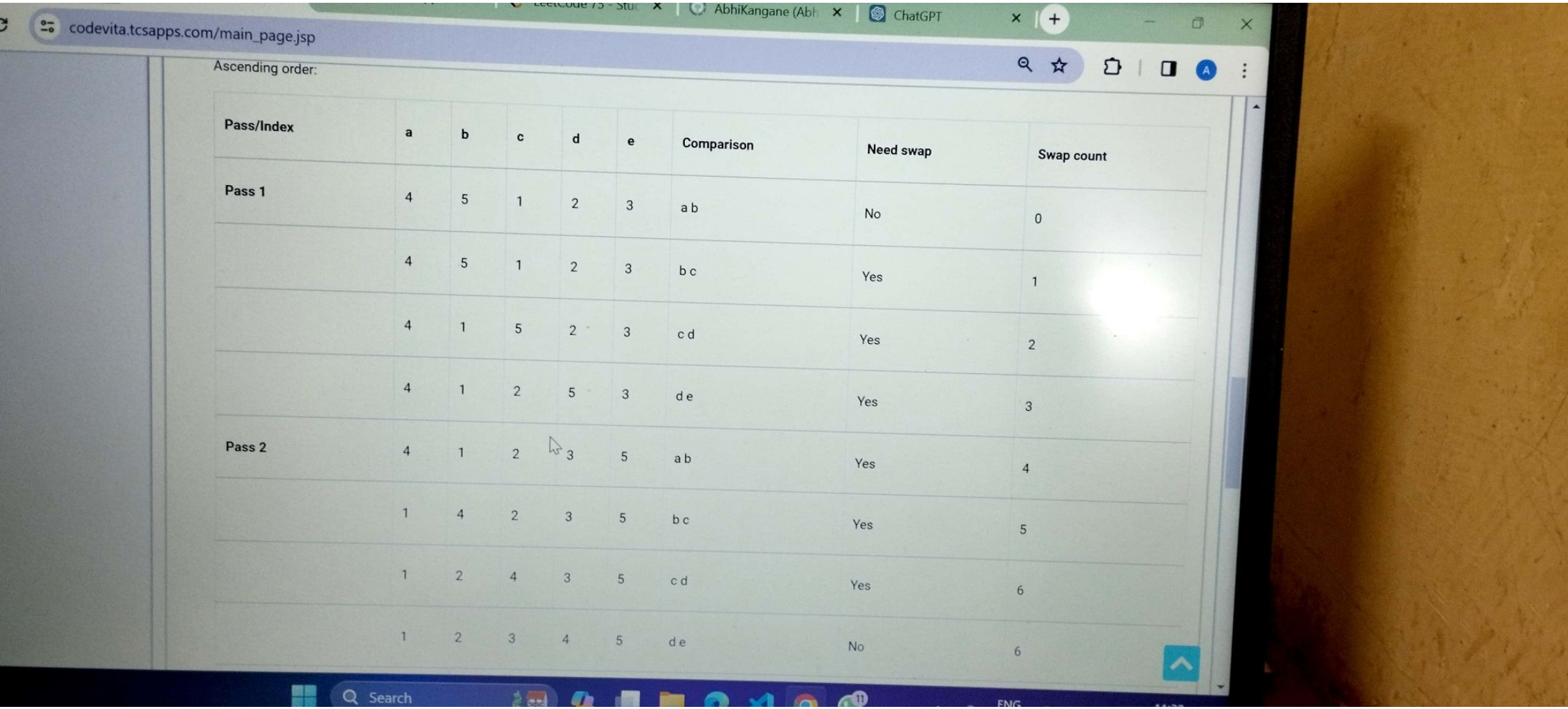
4 5 1 2 3

Output

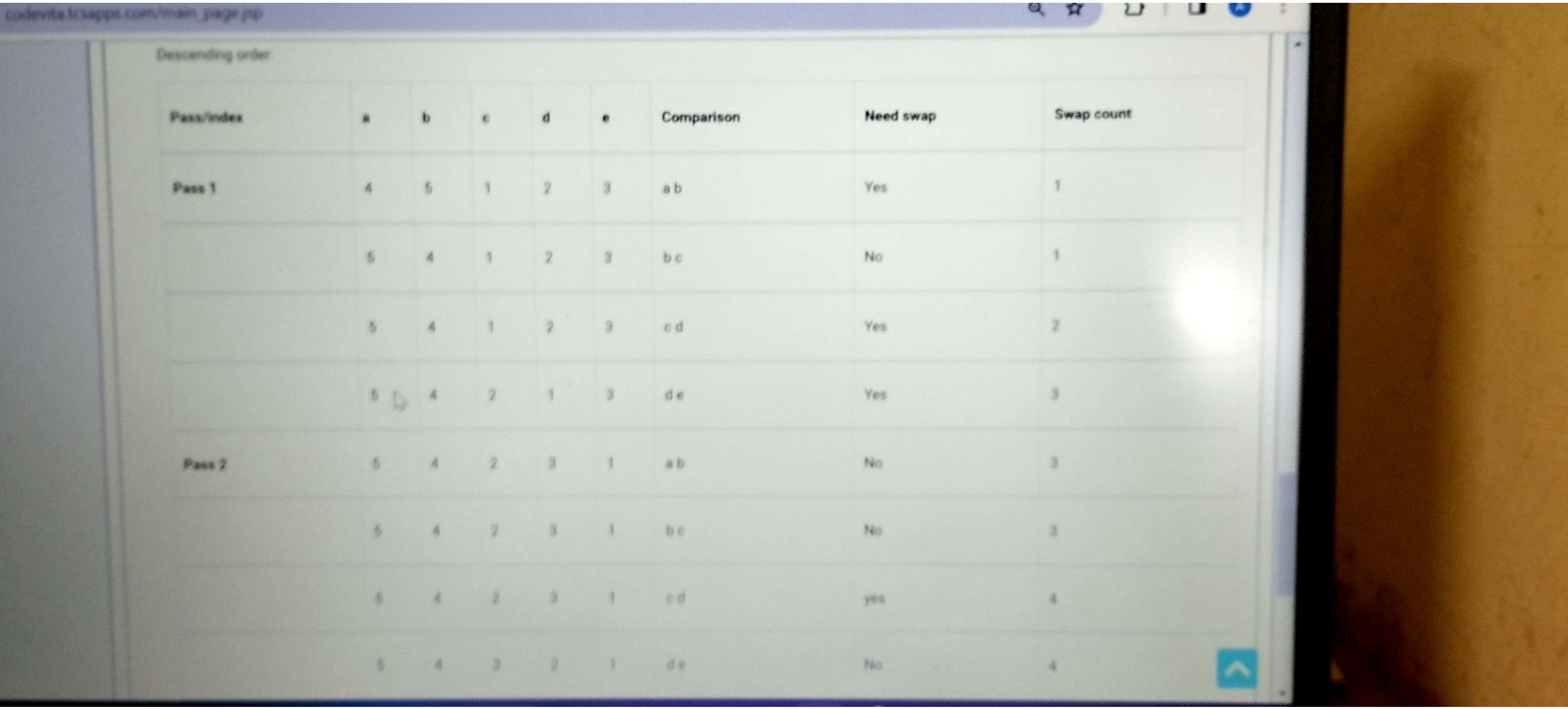
4

Explanation

Ascending order:



Pass/Index	a	b	c	d	e	Comparison	Need swap	Swap count
Pass 1	4	5	1	2	3	a b	No	0
	4	5	1	2	3	b c	Yes	1
	4	1	5	2	3	c d	Yes	2
	4	1	2	5	3	d e	Yes	3
Pass 2	4	1	2	3	5	a b	Yes	4
	1	4	2	3	5	b c	Yes	5
	1	2	4	3	5	c d	Yes	6
	1	2	3	4	5	d e	No	6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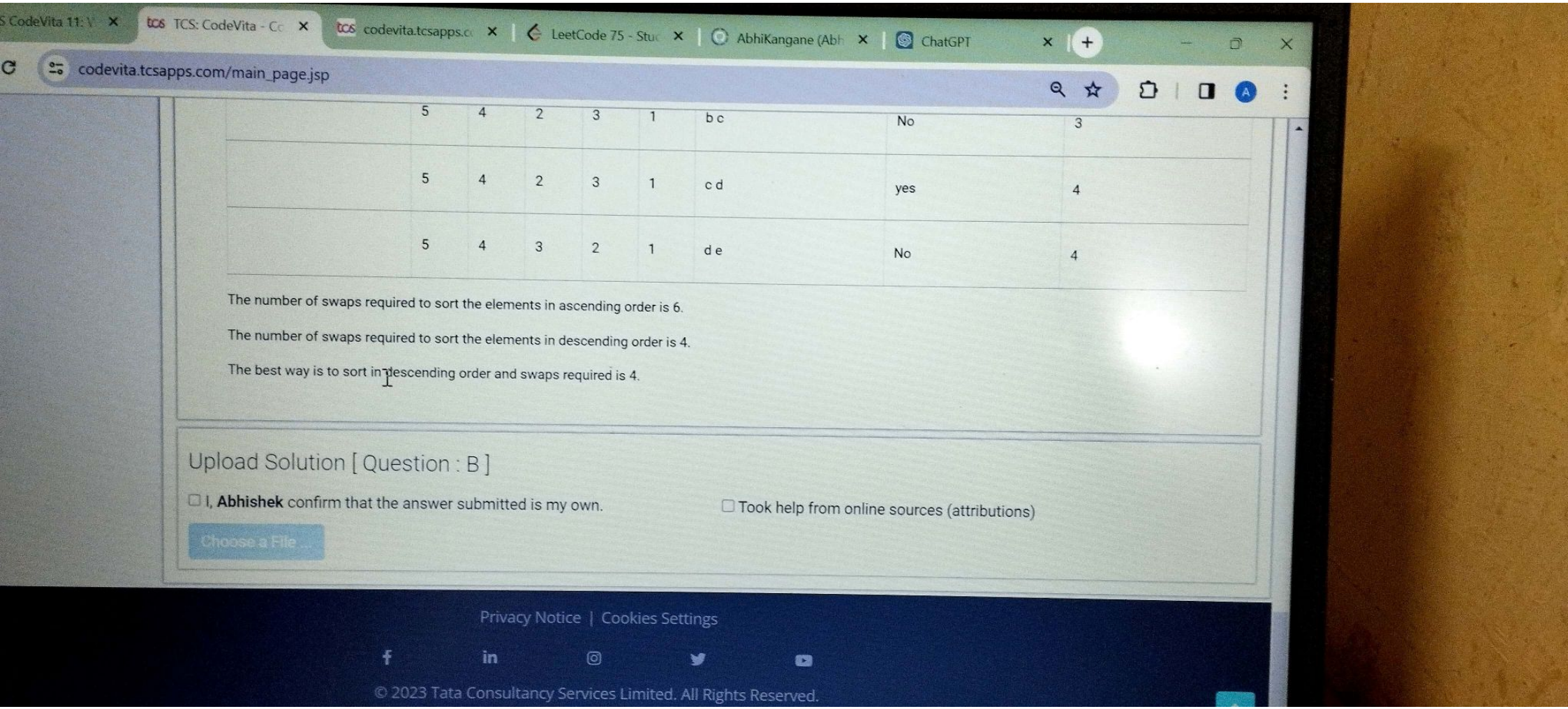
Descending order

Pass/Index	a	b	c	d	e	Comparison	Need swap	Swap count
Pass 1	4	5	1	2	3	a b	Yes	1
	5	4	1	2	3	b c	No	1
	5	4	1	2	3	c d	Yes	2
	5	4	2	1	3	d e	Yes	3
Pass 2	5	4	2	3	1	a b	No	3
	5	4	2	3	1	b c	No	3
	5	4	2	3	1	c d	yes	4
	5	4	3	2	1	d e	No	4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5 4 2 3 1 b c No 3
5 4 2 3 1 c d yes 4
5 4 3 2 1 d e No 4
The number of swaps required to sort the elements in ascending order is 6.
The number of swaps required to sort the elements in descending order is 4.
The best way is to sort in descending order and swaps required is 4.
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MazeRunner

Problem Description

You are a brave adventurer who finds yourself in the middle of a mysterious maze. The maze is represented by a set of integers viz. 0, 1, 2, and 3. Each element in the maze represents a block. You are given the coordinates of the starting block and the target block in the maze, and your task is to reach the target block such that you travel least distance in doing so.

As you explore the maze, you encounter several obstacles that block your path. Obstacles are represented by block with a value of 1, and you must avoid these blocks at all costs. Additionally, the maze contains blocks with a value of 2. In your travelled path from source to destination there cannot be more than two blocks with value 2.

Furthermore, as you make your way through the maze, you notice that some blocks are marked with the value 3. These blocks are extremely dangerous and must be avoided at all costs unless it is the only possible way to reach the target block and you should cross such blocks as less as possible even if it leads to a longer path. You cannot move diagonally or visit any blocks twice. Your starting point can be any block.

Your task is to use your wits and navigate through the maze such that you travel the shortest distance from the starting block to the target block without violating any of the rules mentioned above. If no such path exists, you must print STUCK. Can you find the way out of the maze and reach the target block safely?

Constraints

2 <= R,C <= 15

2*2 <= RxC <= 15 *15 (assuming it has considerate amount of 1 2 and 3).

Left Top represents 0 0 and Right Bottom represents R C.

Input

The first line contains the number of rows (R) and columns (C) separated by spaces.

Next next R lines, each containing C space seperated integers represent the maze.

The next line contains the coordinates of the starting block.

The last line contains coordinates of the target block.

Output

Print an integer representing the length of the shortest path traveled between the starting and the target block. If no shortest path found print STUCK.

Time Limit (secs)

1

Examples

Example 1

Input

3 3

0 3 0

0 0 2

1 0 0

0 0

0 2

Output

4

Explaination

Consider the following diagram:

0	3	0
0	0	2
1	0	0

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You start from the block (0,0). Now, you have two options: either you can take the path having block (0,1) or the block (1,0). Since, an alternate path is available you cannot take path involving block containing number 3. Therefore, you take the path with block with number 0. Then, similarly, you take the block (1,1) with number 0 and the block (1,2) with number 2. You can take at most 2 blocks of such number. Finally, you reach the target (0,3). So, the total distance covered is 4.

Therefore, the shortest path would be (0,0) -> (1,0) -> (1,1) -> (1,2) -> (0,2) as shown below

0	3	0
0	0	2
1	0	0

Example2

Input

3 3

0 1 0

0 3 2

1 2 0

0 0

2 2

Output

4

Explanation

Consider the following diagram:

0	1	0

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Consider the following diagram:

0	1	0
0	3	2
1	2	0

You start from block (0, 0). Then, you move to (1, 0) as that's the only possible route from the start point. From (1, 0), (2, 0) is blocked as it has a value of 1. Therefore, the only option is to choose (1, 1) with value 3. Now, from (1, 1), you can take the route of (1, 2) or (2, 1), but as both of them will give the same shortest distance, you can choose either of them. So, the total distance covered is 4.

Therefore, the shortest path would be (0,0) -> (1,0) -> (1,2) -> (2,1) -> (2,2) as shown below:

0	1	0
0	3	2
1	2	0

Example 3

Input

3 3

0 1 0

0 3 1

0 1 0

0 0

2 2

Output

35°C

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Output

STUCK

Explaination

Consider the following diagram:

0	3	0
0	0	1
0	1	0

If you take account of the previous example its the same but in block (1, 2) or (2, 1) you have obstacle with number 1 and there is no other way you can reach the target therefore you STUCK.

So there will be no path from start to target as shown below:

0	3	0
0	0	1
0	1	0

Example 4

Input

3 4

0 1 0 0

0 3 3 0

0 3 0 0

0 0

0 3

35°C Smoke

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Output

7

Explanation

Consider the following diagram:

0	1	0	0
0	3	3	0
0	3	0	0

You start from block (0,0) then (0,1) is 1 so it's blocked then block (1,0) is the only possible path then from (1,0) you take both the block (1,1) and (2,0). So the possible route will be (0,0) -> (1,0) -> (1,1) -> (1,2) ->(1,3) -> (0,3) or (0,0) -> (1,0) -> (1,1) -> (1,2) -> (0,2) -> (0,3) but here you will notice that we have crossed blocks with 3 two times but according to the rules we must avoid 3 at all cost unless necessary. So, the only possible route is (0,0) -> (1,0) -> (2,0) -> (2,1) -> (2,2) -> (2,3) -> (1,3) -> (0,3) where we cross only one block with 3. Therefore, the total distance is 7.
The path would be as shown below:

0	1	0	0
0	3	3	0
0	3	0	0

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CamScanner

Vinni - The Craftsman

Problem Description

Vinni is a craftsman. He makes different types of toys using different materials and sells them in the market. One day he ran out of raw materials, so he went to the market with N rupees.

There he found M types of materials with which he can make toys. Each type of material has different costs and thus the selling price of toys of each type will also vary from one another.

Given,

N - total amount of money with Vinni (in rupees)

M - total types of materials available in the market.

quantity_available - an array denoting the available quantity of each type where i^{th} integer denotes the available quantity of i^{th} type material.

quantity_needed - an array denoting the quantity needed for making the toy of that type where i^{th} integer denotes the quantity of i^{th} material needed to make toy.

cost_of_one_unit - an array denoting the cost of one unit of material where i^{th} integer denotes cost of one unit of i^{th} type material.

selling_price - an array denoting the selling price of toys where i^{th} integer denotes the price of toy made up of i^{th} material.

Help Vinni in choosing the raw materials to avail maximum amount!

Note: Every toy he is going to make will be guaranteed to be sold in the market.

Constraints

1<= N <= 10^4

1<= M <= 10^3

1 <= quantity_available[i] <= 10^3

1 <= quantity_needed[i] <= 10^3

1 <= cost_of_one_unit [i] <= 10^3

1 <= selling_price [i] <= 10^3

It is not guaranteed that initially there will be enough raw material in the market to make a toy of a given type.

Input

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Input

First line consists of N and M separated by space.

Next four lines consists of four array viz. quantity_available, quantity_needed, cost_of_one_unit, selling_price.

Output

Print the maximum amount Vinni can earn.

Time Limit (secs)

1

Examples

Example 1

Input

21 3

11 12 13

3 4 5

2 1 2

20 15 12

Output

70

Explanation

Type	Quantity available in the shop (in units)	Quantity needed to make one toy (in units)	Cost of one unit of raw material (in rupees)	Selling price of manufactured toy (in rupees)	Total quantity selected (in units)	Cost of selected raw materials (in rupees)	Amount earned by Vinni by selling toys (in rupees)

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Type	Quantity available in the shop (in units)	Quantity needed to make one toy (in units)	Cost of one unit of raw material (in rupees)	Selling price of manufactured toy (in rupees)	Total quantity selected (in units)	Cost of selected raw materials (in rupees)	Amount earned by Vinni by selling toys (in rupees)
Type 1	11	3	2	20	6	2*6=12	2*20=40
Type 2	12	4	1	15	8	1*8=8	2*15=30
Type 3	13	5	2	12	0	0	0

From the above table, it is clear that Vinni can earn a maximum of 70 rupees. There is no other combination which can earn more than 70 rupees.

Example 2

Input

8 2

10 6

1 2

2 1

25 30

Output

115

Explanation

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115

Explanation

Type	Quantity available in the shop (in units)	Quantity needed to make toy (in units)	Cost of one unit of raw material (in rupees)	Selling price of manufactured toy (in rupees)	Total quantity selected (in units)	Cost of selected raw materials (in rupees)	Amount earned by Vinni selling toys (in rupees)
Type 1	10	1	2	25	1	2*1=2	1*25=25
Type 2	6	2	1	30	6	1*6=6	3*30=90

From the above table, it is clear that Vinni can earn a maximum of 115 rupees. There is no other combination which can earn more than 115 rupees.

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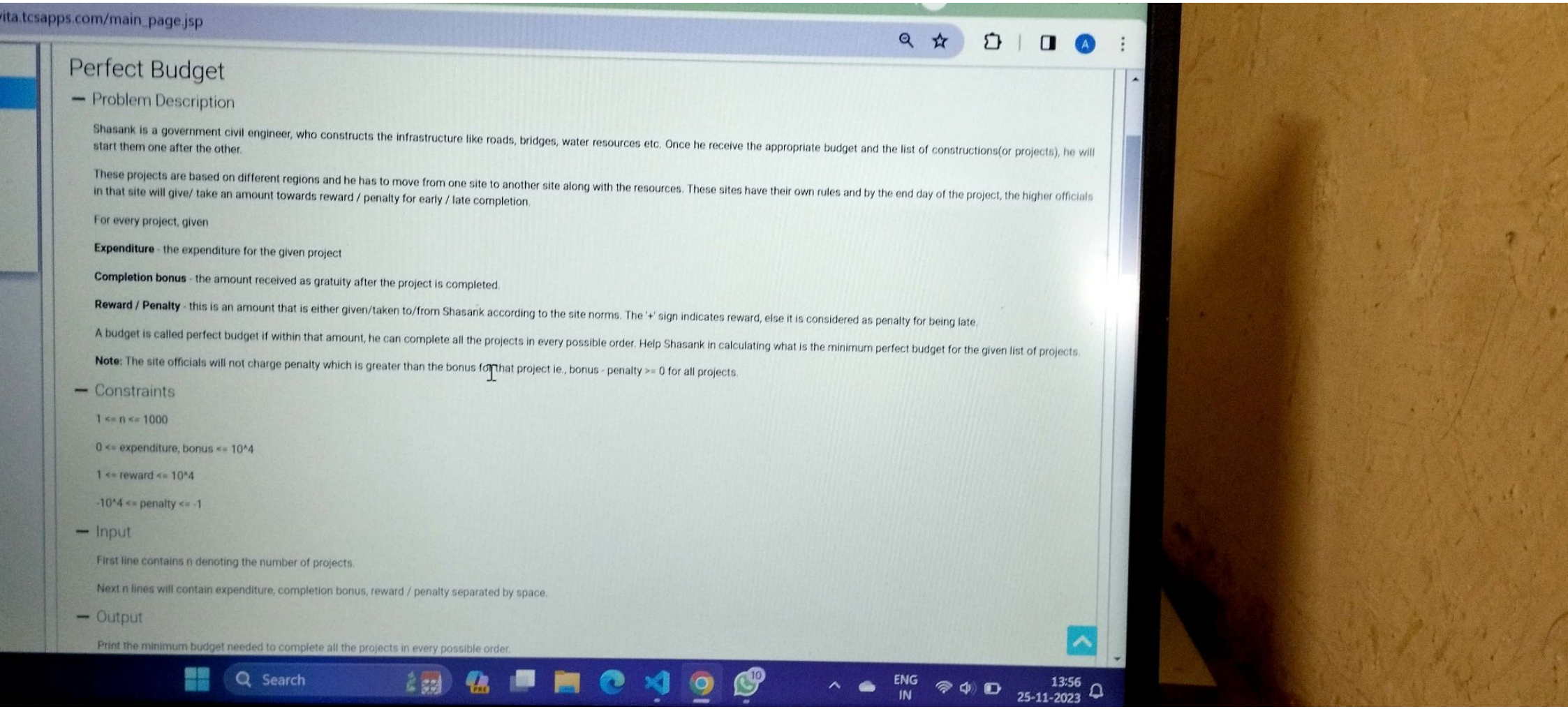
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Perfect Budget
Problem Description
Shasank is a government civil engineer, who constructs the infrastructure like roads, bridges, water resources etc. Once he receive the appropriate budget and the list of constructions(or projects), he will start them one after the other.
These projects are based on different regions and he has to move from one site to another site along with the resources. These sites have their own rules and by the end day of the project, the higher officials in that site will give/ take an amount towards reward / penalty for early / late completion.
For every project, given
Expenditure - the expenditure for the given project
Completion bonus - the amount received as gratuity after the project is completed.
Reward / Penalty - this is an amount that is either given/taken to/from Shasank according to the site norms. The '+' sign indicates reward, else it is considered as penalty for being late.
A budget is called perfect budget if within that amount, he can complete all the projects in every possible order. Help Shasank in calculating what is the minimum perfect budget for the given list of projects.
Note: The site officials will not charge penalty which is greater than the bonus for that project ie., bonus - penalty >= 0 for all projects.
Constraints
1 <= n <= 1000
0 <= expenditure, bonus <= 10^4
1 <= reward <= 10^4
-10^4 <= penalty <= -1
Input
First line contains n denoting the number of projects.
Next n lines will contain expenditure, completion bonus, reward / penalty separated by space.
Output
Print the minimum budget needed to complete all the projects in every possible order.
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1

Examples

Example 1

Input

4

3 9 +4

0 4 -2

7 10 -1

4 2 +1

Output

8

Explanation

Initial Budget	An order which is not possible within the given initial budget
2	P1, P2, P3, P4
3	P4, P3, P2, P1
5	P3, P4, P2, P1
7	P4, P3, P2, P1
8	All orders are possible

Example 2

Input

3

13 9 +6

7 3 -3

9 6 +11

Output

20

Explanation

Initial Budget	An order which is not possible within the given initial budget
4	P3, P2, P1
9	P1, P2, P3
12	P1, P2, P3
15	P2, P1, P3
17	P2, P1, P3
20	All orders are possible

Thus we can complete the given projects in every possible way with a budget of 20, hence print 20.

Bouncing Balls

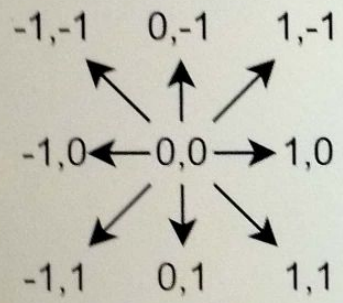
Problem Description

James is playing a shooting game called "Bouncing Balls in the Box." In this game, he needs to shoot all the balls that are moving inside a big rectangular box to win.

James has successfully shot all but two balls, and he has only one bullet left. Luckily, these two remaining balls overlap each other at some point in their movement trajectory. If he aims at the right moment during their overlap, he can eliminate both balls with a single shot.

The game is set in a big rectangular box with dimensions MxN, which is divided into MxN cells. Inside this box, two balls are the targets.

The balls move from one cell to their neighboring cell one step at a time. Each ball maintains its respective direction until it hits the wall of the big box, at which point it changes direction due to the impact with the wall. James needs to time his shot to hit both balls while they overlap for the perfect shot.



1,1	2,1	3,1	4,1	5,1
1,2	2,2	3,2	4,2	5,2
1,3	2,3	3,3	4,3	5,3
1,4	2,4	3,4	4,4	5,4
1,5	2,5	3,5	4,5	5,5

These directions describe how the target box moves within the rectangular box, starting from the initial position [3, 3] and progressing through subsequent cells based on the specified direction. When the target boxes are moving their corresponding directions, they will eventually hit the wall of the rectangular box and bounce back according to the laws of reflection. Here's how the the path and the bouncing behavior would look for each direction from the

These directions describe how the target box moves within the rectangular box, starting from the initial position [3, 3] and progressing through subsequent cells based on the specified direction. When the target boxes are moving in their corresponding directions, they will eventually hit the wall of the rectangular box and bounce back according to the laws of reflection. Here's how the the path and the bouncing behavior would look for each direction from the position [3,3]:

1. Direction: (-1, -1)
   - Initially: [3, 3] -> [2, 2] -> [1, 1]
   - Bounce (due to hitting the wall): [1, 1] -> [2, 2] -> [3, 3] -> ...
2. Direction: (0, -1)
   - Initially: [3, 3] -> [3, 2] -> [3, 1]
   - Bounce (due to hitting the wall): [3, 1] -> [3, 2] -> [3, 3] -> ...
3. Direction: (1, -1)
   - Initially: [3, 3] -> [4, 2] -> [5, 1]
   - Bounce (due to hitting the wall): [5, 1] -> [4, 2] -> [3, 3] -> ...
4. Direction: (-1, 0)
   - Initially: [3, 3] -> [2, 3] -> [1, 3]
   - Bounce (due to hitting the wall): [1, 3] -> [2, 3] -> [3, 3] -> ...
5. Direction: (0, 0)
   - Initially: [3, 3] -> [3, 3] -> [3, 3] (No change in position as the direction is [0, 0])
6. Direction: (1, 0)
   - Initially: [3, 3] -> [4, 3] -> [5, 3]
   - Bounce (due to hitting the wall): [5, 3] -> [4, 3] -> [3, 3] -> ...
7. Direction: (-1, 1)
   - Initially: [3, 3] -> [2, 4] -> [1, 5]
   - Bounce (due to hitting the wall): [1, 5] -> [2, 4] -> [3, 3] -> ...
8. Direction: (0, 1)
   - Initially: [3, 3] -> [3, 4] -> [3, 5]

8. Direction: (0, 1)

- Initially: [3, 3] -> [3, 4] -> [3, 5]
- Bounce (due to hitting the wall): [3, 5] -> [3, 4] -> [3, 3] -> ...

9. Direction: (1, 1)

- Initially: [3, 3] -> [4, 4] -> [5, 5]
- Bounce (due to hitting the wall): [5, 5] -> [4, 4] -> [3, 3] -> ...

Suppose if the ball is in the position [4,3] in the above grid and is moving in the direction (1,1) then the initial path will be [4,3] -> [5,4] and then it had hit the wall, so the reflection will be along the cells, [4,5] -> [3,4] -> [2,3] ...

Now that you know how the balls moves inside the rectangular box, predict when the two target balls will overlap or will be in the same cell, and help James in shooting.

Note:

- James is a good shooter and will never miss the hitting, all he needs is to have both the balls in the same cell.
- Balls will never stop moving until they are shot.

Constraints

$0 < M, N < 1000$

Input

The first line consists of two space-separated integers representing the total number of rows and columns, MxN of the box.

The second line consists of two space-separated integers representing the position of the first target ball.

The third line consists of two space-separated integers representing the direction in which the first target ball is moving. Each integer can be either -1, 0, or 1.

The fourth line consists of two space-separated integers representing the position of the second target ball.

The fifth line consists of two space-separated integers representing the direction in which the second target ball is moving. Each integer can be either -1, 0, or 1.

Output

A Single integer that represents the minimum number of steps after which both the balls overlap. Print "Never" if they will never overlap.

Time Limit (secs)

1

Examples

Example 1

Input

5 5

4 2

1 -1

4 4

1 1

Output

3

Explanation

Target ball 1 is in [4,2] and the path traced was [5,1],[4,2],[3,3]

Target ball 2 is in [4,4] and the path traced was [5,5],[4,4],[3,3]

At the third step both balls will overlap i.e. will be in the same cell. Hence, print 3.

Example 2

Input

10 10

2 2

1 1

6 6

1 1

Output

6

Explanation

Target ball 1 :[2, 2],[3, 3],[4, 4],[5, 5],[6, 6],[7, 7],[8, 8]

Target ball 2 :[6, 6],[7, 7],[8, 8],[9, 9],[10,10],[9, 9],[8, 8]

At the third step both balls will overlap i.e. will be in the same cell. Hence, print 3.

Example 2

Input

10 10

2 2

1 1

6 6

1 1

Output

6

Explanation

Target ball 1 :[2, 2],[3, 3],[4, 4],[5, 5],[6, 6],[7, 7],[8, 8]

Target ball 2 :[6, 6],[7, 7],[8, 8],[9, 9],[10,10],[9, 9],[8, 8]

At the sixth step both balls will overlap i.e. will be in the same cell. Hence, print 6.

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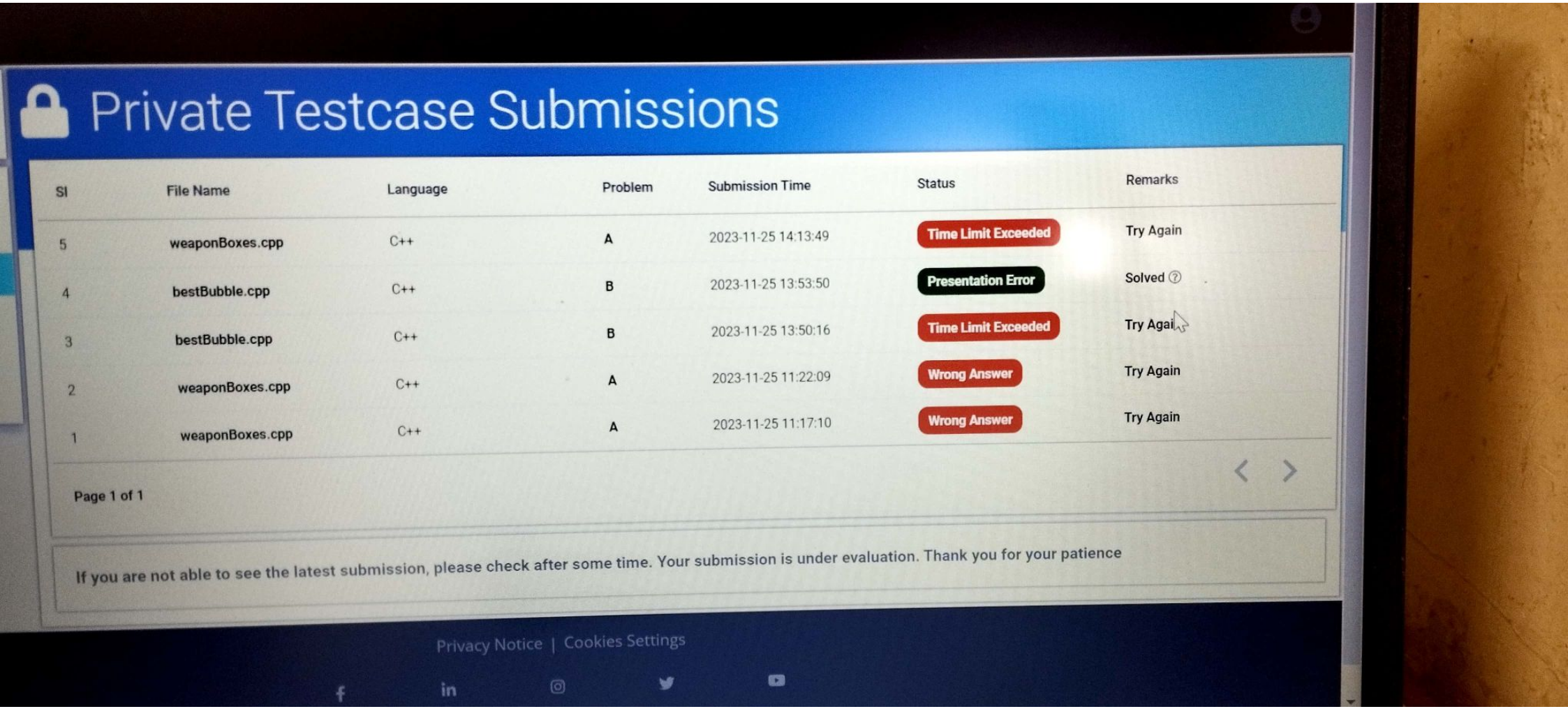
Private Testcase Submissions
Sl File Name Language Problem Submission Time Status Remarks
5 weaponBoxes.cpp C++ A 2023-11-25 14:13:49 Time Limit Exceeded Try Again
4 bestBubble.cpp C++ B 2023-11-25 13:53:50 Presentation Error Solved
3 bestBubble.cpp C++ B 2023-11-25 13:50:16 Time Limit Exceeded Try Agai
2 weaponBoxes.cpp C++ A 2023-11-25 11:22:09 Wrong Answer Try Again
1 weaponBoxes.cpp C++ A 2023-11-25 11:17:10 Wrong Answer Try Again
Page 1 of 1
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