Assignment 1 (Array)

Problem #1 | Jump Game

The jump game assigns you to input an array. Then, the player will start at the first index ([0]), and the player's maximum length is equal to the current index value (For example, if the current index is 5, the player can jump from 1 index to 5 index). If the player can reach at the exact last index (not out of bound), then output the number of jumps (I**t must be minimum jumps!!!**). If not, output "Not Possible".

Input

The input consists of one line:

First Line	An integer n in which $0 \leq n \leq 1{,}000$ as number of elements in an array
Second Line	A sequence of integer $a_1\ a_2\ \ldots\ a_n$ separating between element with a whitespace

Output

The output consists of one line:

First Line	Number of minimum jumps / "Not Possible"

Examples of input and output

Input	Output
4 2 4 1 5	2
6 2 0 0 8 4 5	Not Possible
5 2 3 1 1 4	3

Problem #2 | Symmetric Matrix

Matrix is an arrangement of numbers into rows and columns. Which one of the properties of matrix is symmetric matrix, it is a matrix that has equal value to its transpose ($B^T = B$).

For example:

$$B = \begin{bmatrix} 2 & 3 & 6 \\ 3 & 4 & 5 \\ 6 & 5 & 9 \end{bmatrix}$$

$$B^T = \begin{bmatrix} 2 & 3 & 6 \\ 3 & 4 & 5 \\ 6 & 5 & 9 \end{bmatrix}$$

On top of that, skew-symmetric matrix is when the matrix has equal opposite value to its transpose matrix ($B^T = -B$).

For example:

$$B = \begin{bmatrix} 0 & 2 & 4 \\ -2 & 0 & 3 \\ -4 & -3 & 0 \end{bmatrix}$$

$$B^T = \begin{bmatrix} 0 & -2 & -4 \\ 2 & 0 & -3 \\ 4 & 3 & 0 \end{bmatrix}$$

Further information can be found via: https://byjus.com/maths/what-is-symmetric-matrix-and-skew-symmetric-matrix/

Now that the essential information has been introduced, here is the assignment.

Use multi-dimensional array to construct a matrix and find whether it is a “symmetric matrix” or “skew-symmetric matrix”. Moreover, in case that the matrix is neither symmetric matrix nor skew-symmetric matrix, print “None”.

So, the Output will be in Three Scenarios:

1) If the matrix is symmetric, output will be “The matrix is symmetric”
2) If the matrix is skew-symmetric, output will be “The matrix is skew-symmetric”
3) If the matrix is neither symmetric matrix nor skew-symmetric, output will be “None”

Input

The input consists of n+1 lines:

First Line	Two integers m, n in which $-10{,}000 \leq m,\ n \leq 10{,}000$ as the columns (m) and the rows (n) of the matrix
Second Line	List of “m” elements in the first row (separated by “ ”)
Third Line	List of “m” elements in the second row (separated by “ ”)
…	…
n+1th Line	List of “m” elements in the n row (separated by “ ”)

Output

The output consists of 1 line:

First Line	The result of the matrix

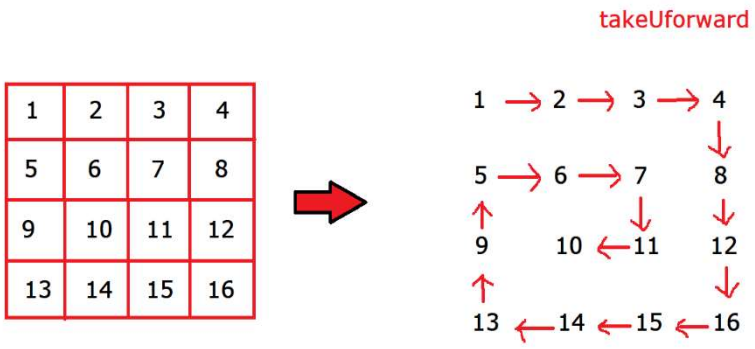
Examples of input and output

Input	Output
3 3 1 2 3 2 4 5 3 5 6	The matrix is symmetric
4 4 4 5 -10 15 -5 7 20 -25 10 -20 8 30 -15 25 -30 6	The matrix is skew-symmetric
3 3 1 0 3 0 4 5 3 7 8	None

Problem #3 | Spiral Array Printer

The Spiral Array Printer problem in this code involves reading input from the user to determine the dimensions of a 2D array **(num1 and num2)** and then reading data from the user to populate the 2D array **(arr[num1][num2])**. The program is designed to print the array data in a spiral order, following the specified pattern in the problem.

Hints: check when the index is hitting the wall (out of the range)



Input

The input consists of two lines:

First Line	Two integers in which as the row and column
Second Line	Enter numbers into the matrix

Output

The output consists of one line:

First Line	An output of spiral array printer

Examples of input and output

Input	Output
3 3 1 2 3 4 5 6 7 8 9	1 2 3 6 9 8 7 4 5
4 6 4 8 2 1 9 6 2 5 0 1 2 7 9 0 1 4 5 9 3 8 1 7 0 3	4 8 2 1 9 6 7 9 3 0 7 1 8 3 9 2 5 0 1 2 5 4 1 0
3 3 -1 3 -9 -8 -7 -12 -33 -8 -4	-1 3 -9 -12 -4 -8 -33 -8 -7

Problem #4 | Matrix Multiplication

Now that we have learned about multi-dimensional array, we will apply the knowledge to solve this problem. Matrix multiplication, also known as matrix product or multiplication of two matrices, creates a single matrix. It's a type of binary operation, in which if A and B are two matrices, the product of the two matrices can be expressed as $X = AB$. Not only that, the matrix can be multiplied if and only if their dimensions are **compatible**. For instance, if $A = [a_{ij}]$ is a $m \times n$ matrix and $B = [b_{ij}]$ is a $n \times p$ matrix. $AB = [c_{ij}]$, where $c_{ij} = a_{i1}b_{1j} + a_{i2}b_{2j} + a_{i3}b_{3j} + \cdots + a_{in}b_{nj}$.

Input

The input consists of one line:

First Line	Contains two space-separated integers, m and n, representing the dimensions of the first matrix A. $(1 \leq m, n \leq 10)$
Second to m +1 Lines	The next m lines each contain n space-separated integers, representing the elements of matrix A. The values are in the range $(-1000 \leq A_{ij} \leq 1000)$
m+2 th Line	The (m +2)th line contains two space-separated integers, k and l, representing the dimensions of the second matrix B. $(1 \leq k, l \leq 10)$
m+3 to m + k +2 Lines	The next k lines each contain p space-separated integers, representing the elements of matrix B. The values are in the range $(-1000 \leq B_{ij} \leq 1000)$

Output

The output consists of one line:

First Line	The output consists of m lines, each containing p space-separated integers, representing the elements of the resulting matrix X = AB. The values are in the range $(-1{,}000{,}000 \leq X_{ij} \leq 1{,}000{,}000)$

Examples of input and output

Input	Output
2 3 1 0 1 0 1 2 3 2 3 5 -1 0 2 -1	5 4 3 -2

3 3 1 2 3 4 5 6 7 8 9 3 3 9 8 7 6 5 4 3 2 1	30 24 18 84 69 54 138 114 90
2 3 5 6 8 5 3 9 2 2 9 3 2 7	Not Compatible

Assignment #5 | Grading

Write a program to store the data for students, including their name and scores. Then, calculate students average score and standard deviation also display student name that got the highest and lowest score.

To find average or mean use this equation: $\frac{\sum value}{size}$

To find Standard deviation use this equation: $\sqrt{\frac{\sum(each\ value - mean)^2}{size-1}}$

Hint: use math.h for power and root function

Input

The input consists of size+1 lines:

First Line	An integer $size$ in which $1 \leq size \leq 100$ as the number of students.
Second to size + 1th lines	The string $name$ which has a length of $1 \leq length \leq 100$ and a float n in which $0 \leq n \leq 100$ as the score of the student separate with whitespace

Output

The output consists of 1 line:

First Line	Display the Mean and SD of the data in 2 decimal point float (%.2f) and display the name of student maximum and minimum score (if the maximum and minimum is the same, prioritize the sequence of the data [Eg. Testcase No.2])

Example of input and output

Input	Output
3 Steve 80.1 Alex 75 Robin 50.5	68.53 12.92 Steve Robin
2 lonely 81.45 Very 81.45	81.45 0.00 lonely lonely
10 Amelia 42.3451 Benjamin 70.1105 Charlotte 98.7654 David 12.3987 Evelyn 55.0293 Francis 86.7821 George 61.4159 Hannah 39.8732 Isaac 24.2010 Jasmine 72.6357	56.36 25.77 Charlotte David