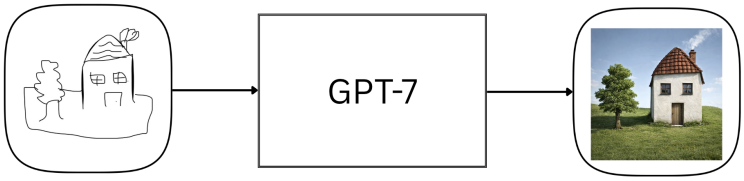
GPT-7

Mr. Kokos just got his dream job at *AnihtoAI* and his first task is to develop an experimental image generation system for GPT-7.

The goal of the image generation system is to convert rough **K**×**K** pixel sketches (provided by the users) into realistic **K**×**K** pixel images. The input sketches and output images of the system are all represented by **K**×**K** matrices of integers. For the purposes of this problem, a **K**×**K** matrix is simply a **K**×**K** 2D array with **K** rows and **K** columns.



For this system to work, there are **M transformation layers**, indexed from **0** to **M-1**, each represented by a **K**×**K** matrix of integers.

The image generation system works as follows:

- A sketch is given as a **K**×**K** matrix, **InputMatrix**. To generate the output image, represented as a **K**×**K** matrix, **OutputMatrix**, the system selects a consecutive range of transformation layers, from index **L** to index **R** (**0** ≤ **L** ≤ **R** < **M**), inclusive, and applies them on the **InputMatrix** as an alternating sum.
- Formally,

  OutputMatrix = InputMatrix + (Layer[L] - Layer[L+1] + Layer[L+2] - Layer[L+3] + ... ± Layer[R])
- **Note:** The first layer (**Layer[L]**) is always **added**. The operations then **alternate between subtraction and addition**.

Matrix Addition and Subtraction Definition

Addition and subtraction of matrices of the same size is defined **element-wise**. That is, the operation is applied independently to each corresponding cell of the matrices.

Example of a **2**×**2** matrix addition:

$$\begin{pmatrix} a & b \\ c & d \end{pmatrix} + \begin{pmatrix} e & f \\ g & h \end{pmatrix} = \begin{pmatrix} a+e & b+f \\ c+g & d+h \end{pmatrix}$$

Your Task

Mr. Kokos needs your help to test the system he developed.

You are given,

- **M** matrices indexed from **0** to **M-1** (the layers of the system).
- **N** matrices indexed from **0** to **N-1** (the sketches), and for each matrix you are given two integers **L** and **R** (the range parameters of the sketches).
- A matrix representing the desired generated image, **TargetMatrix**.

For each sketch, **InputMatrix[i]**, first calculate the corresponding generated image, **OutputMatrix[i]**, as described above. Then, define the **error** of a sketch, **Error[i]**, as the sum of squared differences between **OutputMatrix[i]** and the **TargetMatrix**:

$$\text{Error}[i] = \sum_{j=1}^{K} \sum_{k=1}^{K} (\text{OutputMatrix}[i][j][k] - \text{TargetMatrix}[j][k])^2$$

Your task is to determine which sketch produces the generated image with the **minimum error**, and the **value of that minimum error**. If multiple sketches have the same minimum error, choose the one with the smallest index (the one that was given first in the input).

Input

- The first line contains three integers **N, M,** and **K**.
- The next **M**×**K** lines contain **M**, **K**×**K** matrices, indexed from **0** to **M-1**, representing the transformation layers of the system.
- The next **N**×(**K**+**1**) lines contain **N** sketches, indexed from **0** to **N-1**, each represented by:
  - One line with the range parameters **L** and **R** of the sketch.
  - Followed by a **K**×**K** matrix, representing the **InputMatrix** of the sketch.
- The next **K** lines contain a **K**×**K** matrix, representing the **TargetMatrix**.

Note: Each **K**×**K** matrix in the input consists of **K** lines, with **K** integers per line. The j-th integer in the i-th line corresponds to the (i, j) element of the matrix.

Output

Output two integers:

1. The **(0-based) index** of the sketch with the **minimum error**.
2. The corresponding **minimum error value**.

Constraints

- $1 \le N \le 10^5$
- $1 \le M \le 10^5$
- $1 \le K \le 10$
- Every element of the matrices is an integer whose absolute value **does not exceed 10^3**

Subtasks

- **Subtask 1 (5 points):** $N = 1$, $M \le 100$, $K = 1$
- **Subtask 2 (5 points):** $N = 1$, $M = 1$, $K \le 10$
- **Subtask 3 (25 points):** $N \le 10^3$, $M \le 10^3$, $K \le 10$
- **Subtask 4 (20 points):** $N \le 10^5$, $M \le 10^5$, $K = 1$, $L = 0$ for all sketches
- **Subtask 5 (30 points):** $N \le 10^5$, $M \le 10^5$, $K = 1$
- **Subtask 6 (15 points):** $N \le 10^5$, $M \le 10^5$, $K \le 10$

Example

Example Input

```
2 3 2

1 4
7 0

3 2
5 1

0 6
2 8

0 2
2 1
0 2

1 1
3 3
2 9

4 5
6 7
```

Note: Empty lines in the example input were added only for clarity purposes. There are no empty lines in the actual input.

Example Output

```
1 14
```

Explanation

Input:

```
N = 2, M = 3, K = 2
```

Layer[0]

```
[ 1  4 ]
[ 7  0 ]
```

Layer[1]

```
[ 3  2 ]
[ 5  1 ]
```

Layer[2]

```
[ 0  6 ]
[ 2  8 ]
```

TargetMatrix

```
[ 4  5 ]
[ 6  7 ]
```

Input[0]

```
[ 2  1 ],  L = 0, R = 2
[ 0  2 ]
```

Input[1]

```
[ 3  3 ],  L = 1, R = 1
[ 2  9 ]
```

Generated Images:

```
OutputMatrix[0] = [ 2  1 ] + [ 1  4 ] - [ 3  2 ] + [ 0  6 ] = [ 0  9 ]
                  [ 0  2 ]   [ 7  0 ]   [ 5  1 ]   [ 2  8 ]   [ 4  9 ]

OutputMatrix[1] = [ 3  3 ] + [ 3  2 ] = [ 6  5 ]
                  [ 2  9 ]   [ 5  1 ]   [ 7 10 ]
```

Error:

- Error[0] = $(0-4)^2 + (9-5)^2 + (4-6)^2 + (9-7)^2 = 40$
- Error[1] = $(6-4)^2 + (5-5)^2 + (7-6)^2 + (10-7)^2 = 14$

Therefore,

The index of the sketch with the minimum error is **1**, and its error value is **14**.