E - Hungry Takahashi

Editorial (/contests/abc415/tasks/abc415_e/editorial)

Time Limit: 3 sec / Memory Limit: 1024 MiB

Score : 450 points

Problem Statement

There is a grid with H rows and W columns. Let (i, j) denote the cell at the i-th row from the top and j-th column from the left. Some coins are placed on each cell, and there are $A_{i,j}$ coins on cell (i, j).

Takahashi is initially at cell $(1, 1)$ and has x coins. Over the next $H + W - 1$ days, several events will occur. On the k-th day $(1 \leq k \leq H + W - 1)$, the following things happen in order:

1. Takahashi collects all the coins placed on the cell where he is currently located.
2. Hungry Takahashi consumes P_k coins from his hand to buy food. However, if he has fewer than P_k coins, he cannot buy food and collapses from hunger.
3. If $k < H + W - 1$, Takahashi moves either one cell right or one cell down. He cannot leave the grid. If $k = H + W - 1$, he does nothing.

When there exists a way for Takahashi to finish the next $H + W - 1$ days without ever collapsing from hunger, find the minimum non-negative integer x that can be the number of coins Takahashi initially has.

Constraints

- $H, W \geq 1$

- $H \times W \leq 2 \times 10^5$
- $1 \leq A_{i,j} \leq 10^9$
- $1 \leq P_k \leq 10^9$
- All input values are integers.

Input

The input is given from Standard Input in the following format:

$$
\begin{array}{llll}
H & W & & \\
A_{1,1} & A_{1,2} & \dots & A_{1,W} \\
A_{2,1} & A_{2,2} & \dots & A_{2,W} \\
\vdots & & & \\
A_{H,1} & A_{H,2} & \dots & A_{H,W} \\
P_1 & P_2 & \dots & P_{H+W-1}
\end{array}
$$

Output

Output the answer.

Sample Input 1 Copy

```
2 2
3 2
4 1
1 3 6
```

Sample Output 1 Copy

```
2
```

When $x = 2$, Takahashi can act as follows to avoid collapsing from hunger:

- Initially, he is at cell $(1, 1)$ and has 2 coins.
- Day 1:
  1. He collects 3 coins placed on cell $(1, 1)$, so he has 5 coins.
  2. He consumes 1 coin to buy food, so he has 4 coins.
  3. He moves to cell $(2, 1)$ which is 1 below.
- Day 2:
  1. He collects 4 coins placed on cell $(2, 1)$, so he has 8 coins.
  2. He consumes 3 coins to buy food, so he has 5 coins.

3. He moves to cell $(2, 2)$ which is 1 to the right.

- Day 3:
  1. He collects 1 coin placed on cell $(2, 2)$, so he has 6 coins.
  2. He consumes 6 coins to buy food, so he has 0 coins.

When x is 1 or less, Takahashi will collapse from hunger at some point no matter how he acts. Therefore, the answer is 2.

Sample Input 2 Copy

```
1 1
5
3
```

Sample Output 2 Copy

```
0
```

Even if Takahashi initially has no coins, he will not collapse from hunger.

Sample Input 3 Copy

```
4 7
35 29 36 88 58 15 25
99 7 49 61 67 4 57
96 92 3 49 49 36 90
72 89 40 44 24 53 45
55 43 23 71 77 6 94 19 27 21
```

Sample Output 3 Copy

```
20
```

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