UCF "Practice" Local Contest — Aug 31, 2019

Sub Matrix Sum

filename: `sum`
Difficulty Level: `Hard`
Time Limit: `3 seconds`

You have written many programs to search mazes so matrix search shouldn't be any different, or will it?

The Problem:

An integer matrix with R rows and C columns has $\binom{R}{2}\binom{C}{2}$ sub matrices. We want to select a sub matrix with sum (the sum of all integers in it) greater than or equal to a given integer S. We want the size of the sub matrix to be the least possible. The size of a sub matrix is defined as the number of elements in that sub matrix (i.e., number of rows * number of columns in that sub matrix).

The Input:

The first input line consists of three integers *R*, *C* ($1 \leq R \leq 100{,}000$; $1 \leq C \leq 100{,}000$; $1 \leq R*C \leq 100{,}000$) and *S*. Next R lines contain the description of the matrix. Each of these R lines contains C integers separated by a single space. All integers (other than R and C) are between -10^9 and $+10^9$, inclusive.

The Output:

Print the size of the minimum sub matrix whose sum is greater or equal to the given S. If there is no such sub matrix, output -1.

Sample Input	**Sample Output**
3 3 26 1 2 3 4 5 6 7 8 9	4
3 3 0 -1 -2 -3 -4 -5 -6 -7 -8 -9	-1
2 2 1 -1 -2 0 2	1
