UCF Local Contest — August 31, 2013

Sub Matrix Sum

filename: `sum`

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 contains a positive integer, *t*, indicating the number of test cases. The first line of each test case 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:

For each test case, output 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/Output on the next page)

Sample Input:

```
3
3 3 26
1 2 3
4 5 6
7 8 9
3 3 0
-1 -2 -3
-4 -5 -6
-7 -8 -9
2 2 1
-1 -2
0 2
```

Sample Output:

```
4
-1
1
```