

Task: POW

Flood



XXV OI, Stage I. Source file pow.* Available memory: 256 MB.

16.10–13.11.2017

Byteotia often suffers from heavy rainfalls, which prove disastrous for the local farmers. Their unit square fields are neatly arranged in a rectangle of dimensions $m \times n$ (m rows of n fields each, mn fields in total). To prevent water overflowing from adjacent fields into their own, the farmers have constructed a hodge-podge of barriers, proudly called *dams*, along the field edges. Between each pair of adjacent fields, there is a dam of height between 1 and H millimeters. We assume that there are dams of height H millimeters along all edges of the big outer rectangle.

We are interested in possible water levels on the fields after a (very) heavy rain. For simplicity, we shall only consider scenarios in which the water level (in millimeters) on each field is an integer between 0 and H . Note that for every pair of adjacent fields with a dam of height h between them, the water level on the two fields are either equal or both do not exceed h millimeters. Otherwise, the water would overflow from the field with a higher level (above h millimeters) to the other field.

Write a program that will determine how many different flooding scenarios there are. We deem two scenarios different if there exists at least one field with different water levels in them. As the result could be very large, you should report it modulo 1 000 000 007.

Input

The first line of the standard input contains three integers m, n, H ($m, n, H \geq 1$), specifying the outer rectangle's dimensions and the maximum water level in millimeters.

If $n > 1$, then the next m lines contain $n - 1$ integers each. The i -th number in the j -th of these lines specifies the height of the dam between the fields no. i and $i + 1$ from the left in the j -th row.

If $m > 1$, then the next $m - 1$ lines contain n integers each. The i -th number in the j -th of these lines specifies the height of the dam between the fields no. j and $j + 1$ from the top in the i -th column.

Output

A single integer should be printed to the standard output: the number of possible flooding scenarios modulo 1 000 000 007.

Example

For the input data:

```
3 2 2
1
1
1
1 2
1 1
```

the correct result is:

65

	1
1	2
	1
1	1
	1

Explanation for the example: The water level can either be 2 on all fields (1 scenario), or can be either 0 or 1 on each field independently ($2^6 = 64$ scenarios).

Sample grading tests:

1ocen: $m = 3, n = 3, H = 4$;

2ocen: $m = 1, n = 1000, H = 1000$, the i -th dam has height i ;

3ocen: $m = 1000, n = 500, H = 1$, all dams have height 1.

Grading

The set of tests consists of the following subsets. Within each subset, there may be several unit tests.

Subset	Property	Score
1	$mn \leq 10, H \leq 4$	10
2	$mn \leq 2000, H \leq 10^9$	20
3	$mn \leq 200\,000, H \leq 5$	20
4	$mn \leq 500\,000, \min(m, n) = 1, H \leq 10^9$	20
5	$mn \leq 500\,000, H \leq 10^9$	30