ACM ICPC 2013 Asia Amritapuri Site Online Contest,

23rd October 08:00 PM to 11:00 PM IST

Hosted at hackerrank.com

Blurry Vision

Dr. Ryan Stone is currently floating in space in a Soyuz module, which is a kind of space pod. Due to lack of oxygen, her vision has gotten blurred. She sees multiple images of the same thing. In fact, she looks at the dashboard of this Soyuz module and sees a 2D matrix of size N x M. Each button in this image is labeled with a character between a-z.
Due the blurring of her vision, the actual dashboard, which is considered a sub-matrix of the image she sees, is assumed to repeat in the image. Find what could be the maximum size of the dashboard, assuming that it appears twice (potentially overlapping, but not totally coinciding areas) in the image.

Input:
The first line contains the number of test cases T. For each test case, the first line contains N and M. The following N lines contain M characters each.

Output:
Output T lines, containing the size of the largest possible dashboard size for the corresponding test case.

Constraints:
1 <= T <= 100
1 <= N,M <= 10
The grid contains only lower-case English letters 'a' - 'z'.

Sample Input:

```
4
3 5
ababa
ababa
ccccc
4 5
xyyyx
yxxyy
xyyxy
xxyyx
2 2
ab
cd
2 2
aa
bc
```

Sample Output:
9
6
0
1

Explanation:
For the first input, the dashboard:
aba
aba
ccc

occurs twice - once with the top left corner at (0,0), and once at (0,2).

Time Limit
4s

Memory Limit
256 MB

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Creating a Wormhole

Dr Ryan Stone is the Mission Specialist, and she went out to fix some communications equipment when suddenly news came in about debris from other satellite heading towards them. Very quickly, she realizes that she does not have enough time to get all her equipments back in before the Debris field hits them. Therefore, she decided to adopt an alternative way of handling the debris.

She has got **"N"** pieces of equipments. Each equipment is essentially an iron stick of some length. The i^th equipment has length a_i. She wants to join them end to end to form a closed polygon. She will then send some electric current through the polygon to create a giant magnetic field which will attract all debris. Thus, this polygon will act as a wormhole, sucking in all the debris and allowing rest of the satellite/crew to go unharmed.

She wants to form as big a polygon as possible, and hence she wants to quickly know the maximum number of equipments she can use to form a polygon. Note that the area of polygon should be non-zero, otherwise debris can't pass through it. You should output -1 if no polygon can be formed.

Input:
The first line contains the number of test cases T. For each test case, the first line contains N, the number of equipments. The following line contains N space delimited integers, the ith integer specifying the length of the ith equipment.

Output:
For each test case, output the maximum number of equipments which can be used to form a polygon.

Constraints:
1 <= T <= 100
3 <= N <= 10000
1 <= a_i <= 10^9

Sample Input:
```
2
7
1 12 3 2 5 1 50
3
1 1 2
```

Sample Output:
5
-1

Explanation:
For the first test case, we can use the equipments of lengths 1, 3, 2, 5, 1 and form a polygon out of them. There is no way to form a polygon using more than 5 equipments.

For the second test case, we cannot form a valid polygon from the given equipments.

Time Limit

4 s

Memory Limit

256 MB

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Flee to Shelter

Dr. Ryan Stone has been trying to fix the communications equipment at the Hubble Space telescope when the crew of the Explorer Shuttle receive the news of a debris field headed their way. She now needs to get all her **“N”** instruments back to the shuttle as soon as possible. But at the most, she can carry only **“M”** instruments with her at a time, and it takes her exactly **“T”** minutes to go between the telescope and the shuttle. What is the minimum amount of time she needs to get all her instruments back into the shuttle? Assume that she is at the shuttle while receiving the news.

Input Format:
The first line consists of the number of tests cases, C.
Each of the next C lines consist of 3 integers: N, M and T.
Output Format:
For each test case, output the least amount of time she needs to transfer all her instruments back to the shuttle.

Constraints:
1 <= C <= 1000
1 <= N, M, T <= 100

Sample Input:
1
3 2 10

Output:
40

Explanation:

Dr Stone takes 10 minutes to get from the shuttle to the telescope,
then she takes 10 minutes to carry 2 of the instruments back,
then she takes 10 minutes to get back to the telescope,
and then she takes 10 minutes to carry the remaining 1 instrument back.

Time Limit:
4 s

Memory Limit:
256 MB

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Galaxy Search

The Hubble Telescope has taken a massive panoramic picture of space. NASA plans to study this picture to locate potential galaxies. Basically, they have divided the panorama into a (N x 3) grid of cells, and in each cell they have measured the average light intensity caused by the stars. Now, they wish to completely tile the Nx3 grid using a set of N blocks of one of the following 2 forms:

a 3x1 linear piece:
XXX
or, a 3-tiled L-shaped piece:
L
LL

Note that the above two forms can be rotated and flipped as desired. This tiling would then be used to identify potential locations of galaxies. The basic idea behind a good tiling, is that the intensities as represented within the 3 covered cells of the tile, remains roughly the same.

Thus, they decided upon the following cost metric: the cost of placing a single tile = the range of values among the cells covered = max(values in cells covered) - min(values in cells covered). They wish to minimise the total cost of placing all N tiles. Help them calculate the minimum cost over all possible tilings.

Input Format:
The first line consists of the number of test cases: T. Each test case is then formatted as follows:
The first line of a test case consists of the single integer: N.
This is followed by N lines, each consisting of 3 integers, denoting the intensity of light in each cell.

Output Format:
For each test-case, output the minimum cost of tiling the grid.

Constraints:
1 <= T <= 100
1 <= N <= 300
All grid numbers are between 1 and 10000 (inclusive).

Time Limit:
3s

Memory Limit:
64 MB

Sample Input:
```
2
3
1 1 2
3 2 4
3 3 3
4
1 1 1
2 3 4
2 3 4
2 3 4
```

Sample Output:
```
3
0
```

Explanation:
There are many ways to get 3 as the cost of tiling, one such:
```
--- : cost (2 - 1) = 1
--- : cost (4 - 2) = 2
--- : cost (3 - 3) = 0
```

The second case gives 0 through the tiling:
```
---
|||
|||
|||
```

Time Limit:
3s

Memory Limit:
64MB