

WOBURN CHALLENGE

2015-16 Online Round 2

Friday, December 11th, 2015

Junior Division Problems

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Problem IV: A New Hope

10 Points / Time Limit: 2.00s / Memory Limit: 16M

Submit online: wcipeg.com/problem/wc152j1

“It is a period of civil war. Rebel programs, striking from a hidden computer, have won their first victory against the evil System Tests.”

You might be aware that the events of the *Star Wars* saga took place a long time ago, in a galaxy that was rather far away. But just how far away was it? We can try to describe it by repeating the word "far" a certain number of times in the following sentence format:

A long time ago in a galaxy far, far away...

In the above example, the word "far" is repeated twice. However, we'd instead like to repeat it exactly N ($1 \leq N \leq 5$) times without changing the rest of the sentence at all. There should be a comma right after each occurrence **except for the last one**.

Given N , can you produce the correct sentence?

Input Format

The input consists of a single integer N .

Output Format

Output on a single line the appropriate sentence with "far" repeated N times. It must match the correct answer exactly!

Sample Input 1

1

Sample Output 1

A long time ago in a galaxy far away...

Sample Input 2

4

Sample Output 2

A long time ago in a galaxy far, far, far, far away...



Problem V: The Empire Strikes Back

20 Points / Time Limit: 2.00s / Memory Limit: 16M

Submit online: wcipeg.com/problem/wc152j2

“Do. Or do not. There is no try/catch.”

As part of his intensive Jedi training at the hands of Master Yoda in the Dagobah system, Luke has been given the task of moving some rocks. That may sound simple, but he'll have to move them with his mind, using the power of the Force! Also, some of the rocks are rather heavy.

Yoda has laid out N ($1 \leq N \leq 100$) rocks on the ground, with the i -th rock having a mass of W_i ($1 \leq W_i \leq 100$) pounds. He's instructed Luke to move all of them to another location, one at a time. Unfortunately, Luke's control of the Force is only strong enough to allow him to lift a rock if its mass is no larger than M ($1 \leq M \leq 100$) pounds.

Assuming that Luke tries his best and moves as many of the rocks as he can, what's the total mass of the rocks that he'll lift?

Input Format

The first line of input consists of two space-separated integers N and M .

The next N lines each consist of a single integer W_i , for $i = 1..N$.

Output Format

Output a single integer – the total mass of rocks that Luke can lift with the force.

Sample Input

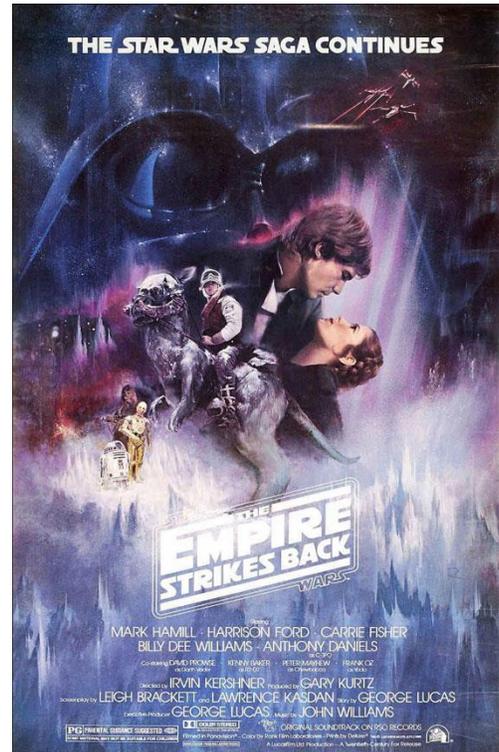
```
6 8
4
9
8
12
7
1
```

Sample Output

```
20
```

Sample Explanation

The 2nd and 4th rocks are too heavy for Luke, but he can lift the remaining 4 rocks, which have a total mass of $4 + 8 + 7 + 1 = 20$ pounds.



Problem VI: Return of the Jedi

30 Points / Time Limit: 2.00s / Memory Limit: 16M

Submit online: wcipeg.com/problem/wc152j3

“Coding? What do you mean, you're coding? Coding what, Artoo? No, wait! Artoo! This is no time for heroics!”

Things are coming to a head on the forest moon of Endor. E ($1 \leq E \leq 100$) friendly Ewoks have been sent out to scout the area, in preparation for an attack on the shield generator protecting the Empire's devastating weapon – the Death Star. From a bird's eye view, the forest can be modelled as a Cartesian plane, with the i -th Ewok located at integer coordinates (X_{ei}, Y_{ei}) ($0 \leq X_{ei}, Y_{ei} \leq 1000$).

Unfortunately, the Empire seems to be onto the rebels' plan! S ($1 \leq S \leq 100$) stormtroopers have similarly been dispatched into the woods to guard the perimeter, with the i -th one stationed at coordinates (X_{si}, Y_{si}) ($0 \leq X_{si}, Y_{si} \leq 1000$). Each stormtrooper is also classified as one of four types, depending on the weaponry they carry. Namely, the i -th stormtrooper is of type W_i ($1 \leq W_i \leq 4$). The BlasTech E-11 rifles may be the standard weapon of these imperial stormtroopers, but most don't know that there are variants of the E-series weapons which serve different purposes and possess different strengths for attacking an opponent. The variants are:

1. The E-11 blaster rifle – a powerful and compact weapon that is the most widely used in the galaxy.
2. The E-11b blaster rifle – an expert version of the standard E-11 with expensive cooling units.
3. The E-11s sniper blaster rifle – a modified blaster for long-range use by imperial scout troopers.
4. The E-15 "Vindicator" sniper blaster rifle – a heavy-power weapon with a short design, making it greatly feared throughout the galaxy.



Each stormtrooper can hit targets that are located up to a distance of R ($1 \leq R \leq 10,000$) units away with deadly accuracy. Ewoks are quick enough to handle any number of a single type of stormtrooper using their nifty spears and slingshots. However, any more than a single type of stormtrooper poses a risk to them, since varying types of blasters are much more difficult to handle. In other words, any given Ewok is in danger if there are two or more *types* of stormtroopers which are no more than R units away.

As a reminder, if the absolute difference between the x -coordinates of two points is x , and the absolute difference between their y -coordinates is y , then the (Euclidean) distance between them is $\sqrt{(x^2 + y^2)}$.

How many of the E Ewoks are in danger?

Input Format

The first line of input consists of three space-separated integers S , E , and R .

The next S lines each consist of three space-separated integers W_i , X_{si} and Y_{si} , for $i = 1..S$.

The next E lines each consist of two space-separated integers X_{ei} and Y_{ei} , for $i = 1..E$.

All pairs of coordinates in the input are distinct — i.e. no two individuals (Ewoks or stormtroopers) are at the same location.

Output Format

Output a single integer – the number of Ewoks that are in danger.

Sample Input

```
4 6 5
1 10 10
1 11 9
2 16 10
3 11 10
1 1
12 10
22 10
7 12
10 6
13 15
```

Sample Output

```
3
```

Explanation

There are four stormtroopers with the first two carrying an E-11, the third carrying an E-11b, and the fourth carrying an E-11s.

The 2nd Ewok is in danger due to being only 2 units away from the 1st stormtrooper (type 1) and 4 units away from the 3rd stormtrooper (type 2).

The 4th and 5th Ewoks are also in danger, as they are within range of the 1st stormtrooper (type 1) and 4th stormtrooper (type 3).

The remaining three Ewoks are safe.

Problem VII: The Force Awakens

40 Points / Time Limit: 2.00s / Memory Limit: 128M

Submit online: wcipeg.com/problem/wc152j4

“Meesa gonna finish... what yousa started.”

After the destruction of the Death Star and death of Darth Sidious, victory for the rebel forces seemed apparent. However, that proved to be far from the truth, as the true puppeteer behind the Galactic Empire finally revealed himself – Sith lord Jar Jar Binks. His vengeance was swift, as he all but eradicated the rebels' resistance and the Jedi presence.

Fortunately, Han Solo was able to survive Jar Jar's wrath, and has a plan to destroy him and topple the Empire. Jar Jar has been tricked into entering an abandoned mirror factory, where he will hopefully bring about his own doom.

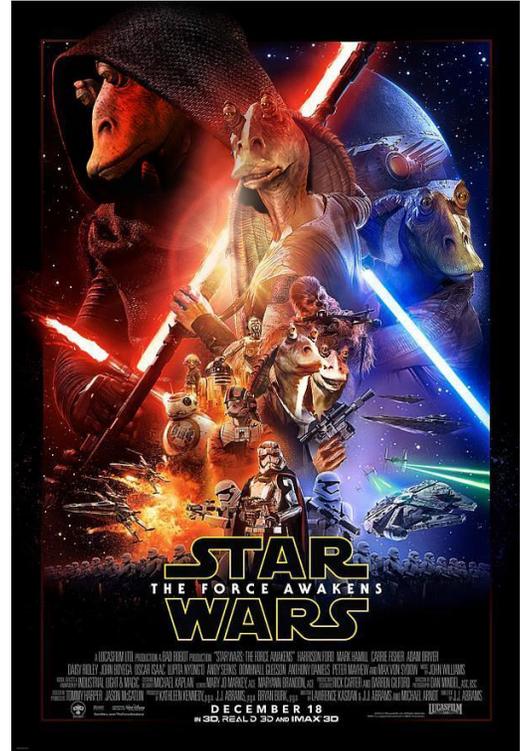
Viewed from above, the factory can be divided into a regular grid of cells, with N rows and M columns ($1 \leq N, M \leq 2000$). The nature of the j -th cell in the i -th row is given by the character $G_{i,j}$, with the following possibilities:

- . The cell is empty.
- # The cell contains a non-reflective barrier.
- / The cell contains a diagonal mirror running from the top-right to the bottom-left, which reflects any incoming laser at a 90-degree angle (for example, a laser entering from the top would leave through the left).
- \ The cell contains a diagonal mirror running from the top-left to the bottom-right, which reflects any incoming laser at a 90-degree angle (for example, a laser entering from the left would leave through the bottom).
- × The cell contains a set of mirrors which reflect any incoming laser back the way it came (for example, a laser entering from the top would leave back through the top).

As Jar Jar walks through the factory, Han will goad him into firing a blaster shot in some cardinal direction (directly up, down, left, or right) from some empty cell. He hopes that the laser will happen to reflect off some mirrors and end up re-entering that same cell, thus killing Jar Jar! That might sound like an unlikely plan to work... but never tell him the odds.

That being said, enquiring minds might like to know what kind of a chance it does have. An empty cell is considered to be "deadly" if, for at least one of the four cardinal directions, Jar Jar would shoot himself if he were to fire a shot from that cell in that direction. How many of the empty cells are deadly?

Note: In test cases worth 80% of the points, $N \leq 50$ and $M \leq 50$.



Input Format

The first line of input consists of two space-separated integers N and M .
 The next N lines each consist of M characters $G_{i,1..M}$, for $i = 1..N$.

Output Format

Output a single integer – the number of empty cells that are considered deadly.

Sample Input

```
5 6
/. \...
./.\.X
\.....
/\./X#
\/.#\.
```

Sample Output

12

Explanation

The following images depict the scenario in the sample input. Cells labeled with blue circles are considered deadly.

