Welcome to Kattis Puzzles at P1

We've prepared this set of challenges for you to measure your skills against. Your task, should you choose to accept it, is to write programs solving as many of the problems below as you can. Your program should read input from standard input and write its answer to standard output, and you can assume that the input will adhere to the specification.

To test your solution, send off an e-mail to challenge@p1.cn with the problem ID as subject and your source code as an attachment. You can use any of our supported languages to solve the problem: C, C++, Go, Java, Objective-C, Python 2

Here are the available problems, ordered by increasing difficulty:

PROBLEM ID	PROBLEM NAME	
REVERSEBINARY	Reversed Binary Numbers	
GETSHORTY	Get Shorty	
COAST	Coast Length	
CATVSDOG	Cat vs. Dog	

Coast Length

Problem ID: coast Time limit: 3 seconds Memory limit: 1024 MB

The island municipality of Soteholm is required to write a plan of action for their work with emission of greenhouse gases. They realize that a natural first step is to decide whether they are for or against global warming. For this purpose they have read the IPCC report on climate change and found out that the largest effect on their municipality could be the rising sea level.

The residents of Soteholm value their coast highly and therefore want to maximize its total length. For them to be able to make an informed decision on their position in the issue of global warming, you have to help them find out whether their coastal line will shrink or expand if the sea level rises. From height maps they have figured out what parts of their islands will be covered by water, under the different scenarios described in the IPCC report, but they need your help to calculate the length of the coastal lines.

Task

You will be given a map of Soteholm as an $N \times M$ grid. Each square in the grid has a side length of 1 km and is either water or land. Your goal is to compute the total length of sea coast of all islands. Sea coast is all borders between land and sea, and sea is any water connected to an edge of the map only through water. Two squares are connected if they share an edge. You may assume that the map is surrounded by sea. Lakes and islands in lakes are not contributing to the sea coast.

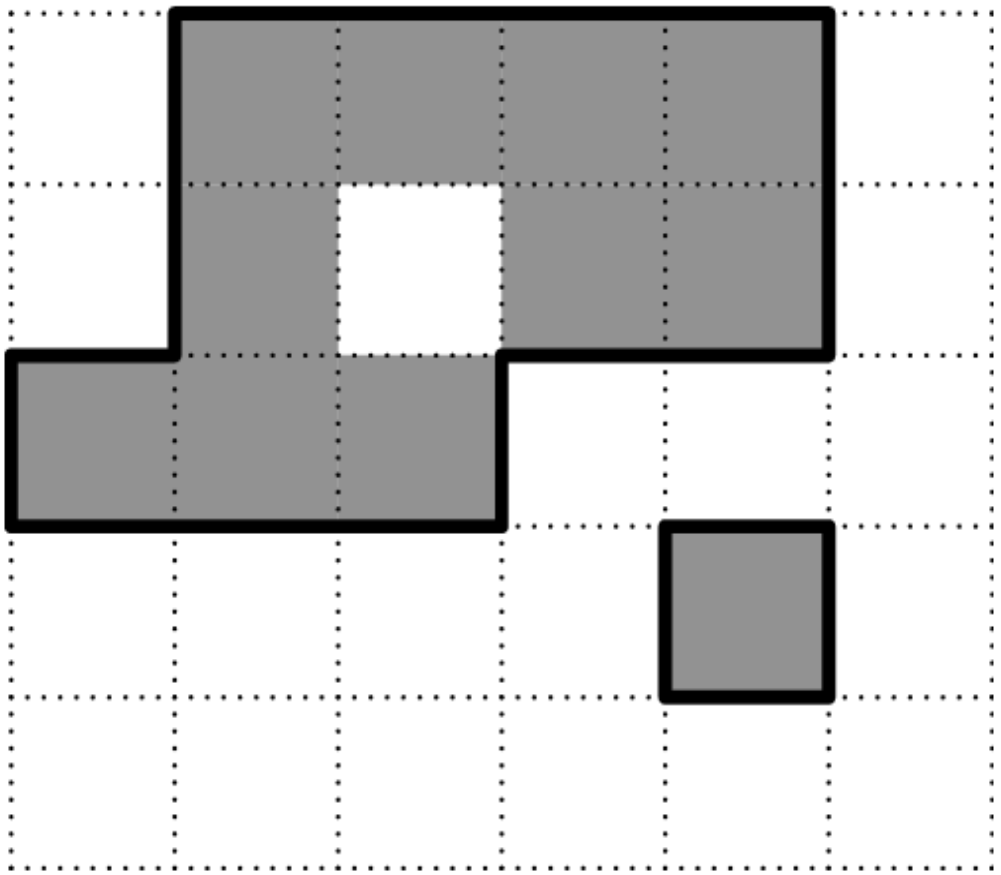

Figure 1: Gray squares are land and white squares are water. The thick black line is the sea coast. This example corresponds to Sample Input 1.

Input

The first line of the input contains two space separated integers N and M where $1 \leq N, M \leq 1000$. The following N lines each contain a string of length M consisting of only zeros and ones. Zero means water and one means land.

Output

Output one line with one integer, the total length of the coast in km.

Sample Input 1

```
5 6
011110
010110
111000
000010
000000
```

Sample Output 1

```
20
```

Download the sample data files

Cat vs. Dog

Problem ID: catvsdog Time limit: 2 seconds Memory limit: 1024 MB

The latest reality show has hit the TV: "Cat vs. Dog". In this show, a bunch of cats and dogs compete for the very prestigious Best Pet Ever title. In each episode, the cats and dogs get to show themselves off, after which the viewers vote on which pets should stay and which should be forced to leave the show.

Each viewer gets to cast a vote on two things: one pet which should be kept on the show, and one pet which should be thrown out. Also, based on the universal fact that everyone is either a cat lover (i.e. a dog hater) or a dog lover (i.e. a cat hater), it has been decided that each vote must name exactly one cat and exactly one dog.

Ingenious as they are, the producers have decided to use an advancement procedure which guarantees that as many viewers as possible will continue watching the show: the pets that get to stay will be chosen so as to maximize the number of viewers who get both their opinions satisfied. Write a program to calculate this maximum number of viewers.

Input

On the first line one positive number: the number of testcases, at most 100. After that per testcase:

- One line with three integers c, d, v ($1 \leq c, d \leq 100$ and $0 \leq v \leq 500$): the number of cats, dogs, and voters.
- v lines with two pet identifiers each. The first is the pet that this voter wants to keep, the second is the pet that this voter wants to throw out. A pet identifier starts with one of the characters 'C' or 'D', indicating whether the pet is a cat or dog, respectively. The remaining part of the identifier is an integer giving the number of the pet (between 1 and c for cats, and between 1 and d for dogs). So for instance, "D42" indicates dog number 42.

Output

Per testcase:

- One line with the maximum possible number of satisfied voters for the show.

Sample Input 1

```
2
1 1 2
C1 D1
D1 C1
1 2 4
C1 D1
C1 D1
C1 D2
D2 C1
```

Sample Output 1

```
1
3
```

Download the sample data files