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Challenge 7 - Tiles   « Prev   Next »

Your best friend, who happens to be Seshat, the goddess of mathematics, has invited you to her home. After giving you a tour, she shows you her favorite room: an infinite empty room with a tiled floor which extends as far as the eye can see. Every tile is identical in size and has some numbers neatly arranged on it. Obviously, Seshat says, every tile has her favorite matrix carved on it (every single tile has the exact same matrix). After seeing you looking in awe at the room, Seshat can't help but have some fun. She hands you a piece of chalk and asks, "Can you find the rectangle whose enclosed elements have the biggest sum?"

Given Seshat's favorite matrix, find the sum of this rectangle. You can consider the sum of an empty rectangle to be 0.

Input

The first line will contain an integer **C**, the number of cases for our problem.
Each case consists of a line with two integers, **N** and **M**, the dimensions of the matrix carved on the tiles. A set of **N** lines, each with a string of size **M** follows, describing the matrix. Each character **c** indicates a value of the matrix. An uppercase character indicates a positive value A = 1, B = 2 ... Z = 26, a lowercase character indicates a negative value a = -1, b = -2 ... z = -26 and a dot indicates 0.

Output

For each case, a line starting with "Case #x: " followed by the sum of the rectangle. If the sum is infinity, print INFINITY instead. Every line is followed by a new line character.

Examples

```
Case 1:          Case 2:          Case 3:          Case 4:
```

2 2	1 1	3 3	3 3
AB	c	aea	Bca
CD		aCb	CeB
		aBa	eAc

In Case 1, the answer is infinity.

In Case 2, the answer is 0. An empty rectangle is better than anything else.

In Case 3, the answer is 5.

In Case 4, the answer is 6. The rectangle contains the numbers -1, 2, 2, 3.

Limits

- 1 ≤ **N**, **M** ≤ 1000

Sample Input

```
4
2 2
AB
CD
1 1
c
3 3
aea
aCb
aBa
3 3
Bca
CeB
eAc
```

Sample Output

```
Case #1: INFINITY
Case #2: 0
Case #3: 5
Case #4: 6
```

Test your code

You can test your program against both the input provided in the test phase and the input provided in the submit phase. A nice output will tell you if your program got the right solution or not. You can try as many times as you want to. Be careful with extra whitespaces, the output should be exactly as described.

Test your program against the input provided in the test phase

Download test input

Program output:

Seleccionar archivo   Ningún archivo seleccionado

Submit test output

Test your program against the input provided in the submit phase

Download input

Program output:

Seleccionar archivo   Ningún archivo seleccionado

Submit output

During the submit phase, in some problems, we might give your program harder inputs. As with the test token, a nice output will tell you if your program got the right solution or not. You can try as many times as you need.

In the actual contest you first need to solve the test phase before submitting the code, you must provide the source code used to solve the challenge and you can only submit once (once your solution is submitted you won't be able to amend it to fix issues or make it faster).

If you have any doubts, please check the info section.

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