Room Temperature

Filename: `temperature`

Sharon built a new rectangular hotel with n x m rooms. When people move in, they each set the air conditioning (AC) to their preferred temperature setting, between 0 and 9. However, some rooms are unoccupied so the AC is not turned on, and the temperature in these rooms is unknown. What is known, however, is that the temperature in these rooms is equal to the average of the temperatures of all adjacent rooms. A room is adjacent to another if they are directly next to each other in the four cardinal directions (up, right, down, left).

For example, if a room is adjacent to three rooms with temperatures 3, 6, and 9, then the temperature in that room will be equal to (3+6+9)/3 = 6.

Sharon now wants to know what the temperature is in every room. It is guaranteed that at least one room is occupied, and therefore the temperature in that room is known. It is also guaranteed that at least one room is unoccupied.

The Problem:

Given information about each of the rooms in the hotel, determine the temperature in every unoccupied room.

The Input:

The first line of the input file begins with a single, positive integer, t, representing the number of hotels. For each hotel, multiple lines follow. The first contains two integers $1 \leq n, m \leq 10$ representing the length and width of the hotel. Then, n lines follow each with m characters, representing the n x m rooms. Each character is either a digit [0-9] representing the temperature setting, or the character '?' if the temperature is unknown.

The Output:

For each test case, output n+1 lines. The first line consists of a single string, "`Hotel #i:`" without the quotes, where `i` is the number of the hotel. The next n lines each contain m characters representing the temperature of every room. The temperatures in the output should be rounded to the nearest whole integer - so 3.50 becomes 4 and 3.49 becomes 3. Print a blank line in between each test case.

(Sample Input and Output are on the next page)

Sample Input:

```
3
2 3
1?1
449
3 3
9?0
???
2?3
4 4
????
?8??
???1
????
```

Sample Output:

```
Hotel #1:
121
449

Hotel #2:
940
542
233

Hotel #3:
7765
7854
6641
6542
```

Note: There is a blank line after the last test case.