**PROBLEM**: The “Capsules” puzzle, created by grandmaster puzzler Wei-Hwa Huang, is as follows: Place numbers in the grid so that each outlined region contains the numbers from 1 to *n*, where *n* is the number of squares in the region. The same number can never be adjacent to itself, not even diagonally. Each capsule has a unique solution. For example:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| |  |  |  |  |  | | --- | --- | --- | --- | --- | |  |  |  |  |  | |  |  |  |  |  | | **4** |  |  |  | **1** | | |  |  |  |  |  | | --- | --- | --- | --- | --- | | 1 | 2 | 1 | 2 | 1 | | 3 | 5 | 3 | 4 | 3 | | **4** | 2 | 1 | 2 | **1** | |

**INPUT:** The initial grid is input in the following format: the number of rows *r*, the number of columns *c*, the string encoding the outline of each of the *r* x *c* cells, the number of cells *n* that have an initial value, and finally, the *n* initial values. The grid at the left is:

3, 5, 32EB69CB6DFBE9E, 2, 114, 151

The outline of each cell is encoded as a hex number, whose 4-bits indicates if there is a top, right, bottom, and left border, respectively. For example, the cell containing the 4 in the lower left corner has a bottom and left border, so it’s encoded as 0011, or the hex number 3. The cell to its right has just a bottom border, so it’s encoded as 0010, or the hex number 2. The cells are listed row by row, starting at the lower-left.

The initial value of a cell is a 3-digit number: row, column, value. So, the number 4 in the lower left cell (row 1, column 1) is 114, and the 1 in the lower right corner (row 1, column 5) is 151.

**OUTPUT**: Solve each grid and print the following:

1. The number of interior intersections that do not touch a border. (In the example above, there are 8 interior intersections; the only intersection with no borders is between rows 1 and 2, columns 1 and 2.)
2. The number of regions.
3. The number of regions that have no initial values.
4. The sum of numbers on the top row.
5. The sum of numbers on the leftmost column.

**SAMPLE INPUT**

**(*For ease of readability, we are showing a space after every c characters of the grid string; do not input that space!!):***

1. 3, 5, 32EB6 9CB6D FBE9E, 2, 114, 151
2. 7, 7, BA63636 36D9C9C 98EB636 3636D9C 9C9C32E 36361C7 9C9CDBC, 6, 112, 233, 324, 566, 652, 773

**SAMPLE OUTPUT:**

|  |  |
| --- | --- |
| 1. 1 2. 5 3. 3 4. 7 5. 8 | 1. 9 2. 12 3. 8 4. 17 5. 16 |
| **Capsule #2:** | **Solved Capsule #2:** |

**TEST DATA**

* ***Answers must match the output exactly as shown.***

* ***For readability, we show a space after every 4 characters of the 3rd element on each row; do not input that space!!***

**TEST INPUT:**

1. 6, 5, 36B26 9479C 7D967 9A655 36DD5 98EBC, 9, 112, 134, 153, 323, 411, 432, 455, 614, 631
2. 5, 3, 3E7D3C7D716D9CF, 2, 111, 514

**TEST OUTPUT:**

|  |  |
| --- | --- |
| **Capsule #1:** | **Solved Capsule #1** |

1. 3
2. 6
3. 1
4. 10
5. 19
6. 1
7. 5
8. 3
9. 8
10. 10