12900   Flood in Gridland

The country of Gridland is very special. It is divided into N rows and M columns; and both of them are 1 indexed. The intersection cell of the i-th row and the j-th column will be denoted as land(i, j). land(i, j) is either a flat surface of height Hij or does not have any land rather it contains only bottomless sea water. All heights are measured from sea level; if Hij is negative then it means the surface of that land is under the sea level.

Gridland is very much prone to natural calamities. Some lands of the Gridland are so low that they become flood affected most of the time in a year. Again some land are so high that there is always fog in those lands. This has been a dream of the people from Gridland for many years that the height of the country will be adjusted to reduce effect of natural calamities. Government of Gridland decided to increase or decrease heights of all the lands such that heights of all the lands reside between L and U. But people of Gridland also wants to maximize the average height of the country. So government of Gridland decided to maximize the sum of the heights of all the lands.

To increase or decrease height government can perform two operations

1. Increase the heights of all the land of a row by 1.

Example 1:

2. Decrease the heights of all the lands of a column by 1.

Example 2:

As mentioned above some cell contains bottomless sea water, those cells will be denoted as X. No operation has any effect on those lands.

Given N, M, L, U and the height H of all the lands, use the operations described above to increase or decrease height of the lands such that the new heights of the lands are between the range L and U (inclusive) and sum of the heights of all the lands is the maximum. Help government of Gridland to solve the problem.

Input

First line of the input contains a positive integer T ($T \leq 300$), number of test cases. First line of each test case contains four integers N, M, L and U ($1 \leq N, M \leq 75$, $-1000 \leq L \leq U \leq 1000$). Each of the next N lines contains M integers H_{ij} ($-500 \leq H_{ij} \leq 500$), height of $land(i, j)$ or character 'X', where 'X' means that the cell has bottomless sea water.

Note: 90% of all the test cases contain $N, M \leq 20$.

Output

First line of each test case contains test case number and 'Impossible', if there is no way to change the heights of all the lands with the operations described above such that the new height of each land remains between L and U. Otherwise print the sum of the new heights of all the lands (except 'X' marked lands). Following line contains N non-negative integers R_i ($R_i \leq 1000000$), where R_i is the number of operation 1 applied on the row i and the next line will contain M non-negative integers C_j ($C_j \leq 1000000$), where C_j is the number of operation 2 applied on column j.

If there is any solution for a test case, then there will always be a solution with $0 \leq R_i \leq 1000000$ and $0 \leq C_j \leq 1000000$.

If there are multiple solutions, print any of them.

Sample Input

```
4
3 3 0 1
-1 -1 0
0 X 2
1 1 2
2 2 5 10
1 4
3 2
1 1 5 10
X
2 2 7 7
1 7
7 7
```

Sample Output

```
Case 1: 7
2 0 0
0 0 1
Case 2: 36
15 17
10 9
Case 3: 0
0
0
```

Case 4: Impossible