Path

Introduction

Professor Beetlesey had his hands full. The deadline of putting the prototype of a new remotely operated military vehicle into service was approaching inexorably. As expected of the professor, the invention was not trivial. The creation – called a *beetle fighting vehicle* (BFV) – was of organic origin. In order for it to achieve its full dimensions one should not encase it in armor, but provide it with proper growing conditions, i.e. provide the best possible nutrients. A vehicle "grown" this way will have much greater combat survivability than its steel counterparts.

Experiments showed that the only feed that facilitates proper growth of BFVs is the Complete Mix delivered solely on large pallets, dimensions of $M \times N$ fields. The problem is that various types of feed located on different fields of each pallet have very diverse characteristics. As a result the feed impact on the *nourishment level* of the BFV can vary a lot.

One day, coming back to his laboratory from... the Faculty Board meeting, professor Beetlesey was contemplating the optimal use of the Complete Mix. By accident, he stumbled upon a group of apprentices who were playing a game of large format checkers. It caught the professor's eye, as instead of a board they used an empty pallet and instead of game pieces – failed BFV specimens. *"Dear friends!"* – the professor said in a friendly but stern manner – *"I have a much better idea how to use your potential. Come with me!"*.

Problem

Congratulations. You have just become the operator of the latest BFV model! Now help the professor use the feed available on the pallet to achieve the highest possible nourishment level of the experimental vehicle.

You have the plan of the pallet with dimensions of $M \times N$ fields. Each feed batch on the pallet (each field) was tagged with a specific number defining the type of food (any given field contains only one type of food). Eating the correct batch allows for a significant increase in the BFV's nourishment level; eating an incorrect batch may nourish poorly or not at all. Due to the complicated metabolism of BFVs their current nourishment level depends on the full history of their consumption.

Feeding is carried out under the operator's full control and lasts until the BFV finishes all feed batches from the pallet. Due to safety standards the vehicle must remain on the pallet at all times, cannot move diagonally, neither can it be moved across the already empty fields.

At the beginning – when the BFV is hungry – its nourishment level is $X_0 = 1$. When it enters a field with the type of food V, its current nourishment level rises to:

$$X_{i+1} = X_i + (X_i \mod V), \tag{1}$$

where X_{i+1} is the new value of nourishment, X_i is the current value of nourishment and V is the type of food on a given field. In consequence, proper nourishment level is strictly interrelated with the selected path of movement.

When the BFV starts eating it is placed on any field selected by the operator. Then it is moved to adjacent non-empty fields of the pallet. When the BFV consumes the last batch of food from the pallet, its consumption mode is switched off and its final nourishment level is measured ($S_u = X_{M \cdot N}$), and the operator must submit the latter to the professor.

Input data

Test sets are given in `path*.in` files.

$$1 \leqslant T \leqslant 10$$
$$2 \leqslant M, N \leqslant 100$$
$$1 \leqslant V_{i,j} \leqslant 10^5$$
$$1 \leqslant i \leqslant M$$
$$1 \leqslant j \leqslant N$$

The first line of the test set includes one integer T denoting the number of tests. Description of each test includes the information describing the pallet – its size and types of food located on all of its fields.

The first line of the pallet description includes two natural numbers M and N denoting the pallet's dimensions in fields.

The following N lines include M $V_{i,j}$ numbers each. Each of the $V_{i,j}$ numbers denotes the type of food on i-th field in j-th line.

Output data

For each test provide the description of a path the BFV is going to follow. Descriptions must be given in the same order as input data.

The first line of each description should include two natural numbers separated by a space: x ($1 \leqslant x \leqslant M$) and y ($1 \leqslant y \leqslant N$) denoting the coordinates of the path start point.

The second line of the description should include exactly $(M \cdot N - 1)$ characters C_k, each of them denoting consecutive movements along the path beginning the start point. Each character C_k can take one of the following values:

- '`N`' – for the move to $j - 1$ line (up),
- '`E`' – for the move to $i + 1$ field in the same line (to the right),
- '`S`' – for the move to $j + 1$ line (down),
- '`W`' – for the move to $i - 1$ field in the same line (to the left).

The third line of each description should include one number S_u ($1 \leqslant u \leqslant T$), denoting final nourishment level of the BFV.

Example

For input data:

```
2
3 2
7 2 5
9 1 6
3 3
7 2 5
9 1 6
11 4 3
```

One of possible solutions is:

```
3 2
NWSWN
9
1 1
SSENNESS
17
```

Example clarification

The tables below show consecutive steps of the BFV's movement for the example tests. The first row of values (quantity i) represents the steps of the vehicle's movement – consecutive natural number is assigned to each consecutive stage. The column containing the value $i = 0$ denotes the situation before the BFV is placed on the pallet.

The following row provides food types available on consecutively visited pallet fields (movement beginning at the start point and then according to the instructions in the form of a sequence of characters '`N`', '`E`', '`S`' and '`W`').

The row with the value X_i in each table denotes the nourishment level of the BFV during its consecutive movements across the pallet. The last item (marked with color) of this row denotes final nourishment level (the value S_u from output data).

Table 1: Consecutive steps of feeding the beetle fighting vehicle – example, test number 1.

Quantity	Values						
i	0	1	2	3	4	5	6
V		6	5	2	1	9	7
X_i	1	2	3	4	4	8	9

Table 2: Consecutive steps of feeding the beetle fighting vehicle – example, test number 2.

Quantity	Values									
i	0	1	2	3	4	5	6	7	8	9
V		7	9	11	4	1	2	5	6	3
X_i	1	2	4	8	8	8	8	11	16	17

Score

If the following conditions are satisfied for each test:

- output data is in the correct format,
- every path on every pallet passes through all fields of the pallet,
- every field on every pallet was visited exactly once,
- final nourishment level of the BFV S_u is calculated correctly,

the score for the set amounts to the sum of S_u values from all tests. Otherwise the score is 0.