4308 Chinese Checkers

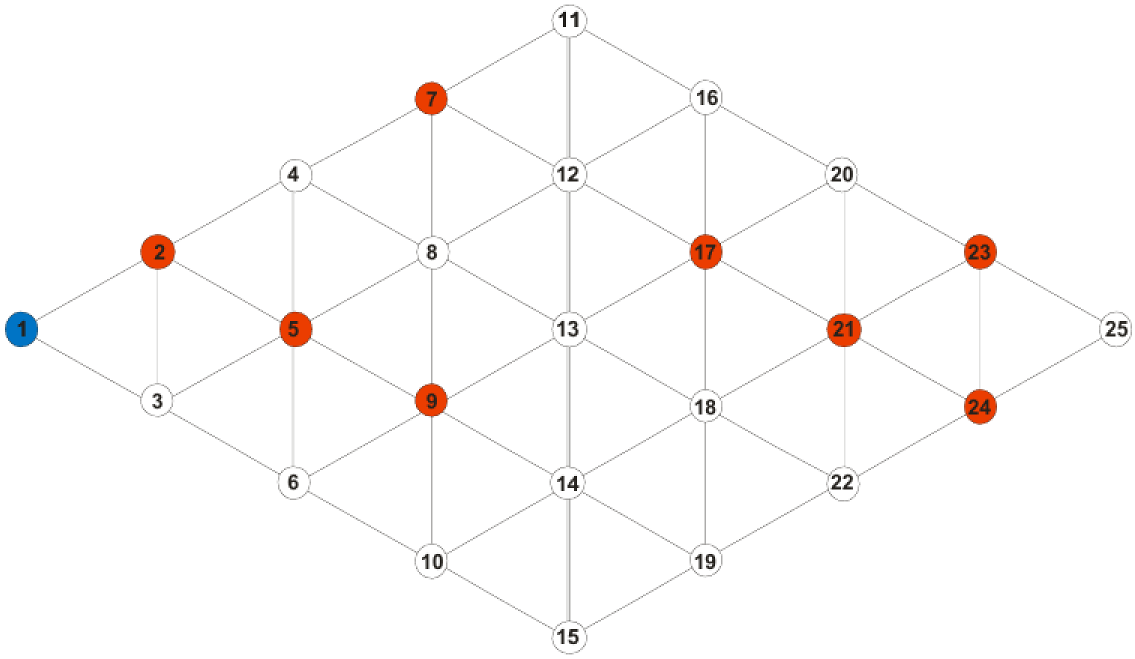
When playing Chinese Checkers, the objective of the game is to place one's marbles in the corner opposite of one's starting position of a pitted hexagram with form of a six-pointed star by single moves or jumps over other pieces.

The rules to move the marbles through the board are:

- You can move to any adjacent and unoccupied cell
- If there's an unoccupied cell after an adjacent occupied cell (through a straight line), you can jump it and repeat it as many times as you need.

A naive but common way to move the pieces on the board is selecting a marble and looking for the sequence of moves that reach as close to the destination corner as possible (the cell with the highest value). Your job will be to find this route.

Suppose that marbles are always in three possible places: the center of the board, the origin corner and the destination corner. So you have a scenario like this.



The problem to solve is for a scenario with a variable number of cells, determined by the number of cells in each side of the figure.

Input

The first line will contain the number of cases to solve. After this, for each case, you will have:

- N, the number of cells for each side of the scenario. $2 \leq N \leq 30$.
- In the next line there is a list of occupied cells.
- In the next line there is a list of origin positions.

You can assume that none of the origin positions are in the list of occupied cells.

None line will be more than 2000 characters

There's a blank line to separate each test case

Output

Print

`Case #`< *number* >`:`

for each test case. In the next line print for each origin position the cell closest to the destination cell that can be reached. If there's more than one cell that has the same distance to the destination, print the one with the highest value. Let's define the distance to destination as the minimum number of moves from the origin to the destination cell ignoring occupied cells, for example 16, 17, 18 and 19 are 3 moves far from 25.

Print a blank line to separate the test cases.

Note: The sample input corresponds to the above figure, with the first origin cell (in the list) corresponding to the blue marble in the figure. Note that this marble can move from 1 to 25 through the sequence 1 - 4 - 6 - 13 - 20 - 25.

Sample Input

```
1
5
2 5 9 7 17 21 23 24
1 11 8 16
```

Sample Output

```
Case #1:
25
25
13
20
```