

## **Problem B2: Second Second Friend**

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Problem

My Submissions



**B2 Submission Problems** 

If you're having trouble submitting for B2: Second Second Friend, please send us a clarification with your source code and output. You will receive the correct penalty time for your submission.

Note: The only difference between this problem and problem B1 is that here, scenes are larger and may contain rocks.

Boss Rob painted a beautiful scene on a 2D canvas of  ${\cal R}$  rows by  ${\cal C}$  columns, containing zero or more happy little trees and zero or more rocks.

To make sure none of his trees are lonely, Rob would like you to add as many trees as you'd like (possibly 0) to empty spaces so that each tree in the final painting has at least two tree *friends*, that is, two trees which are each adjacent to it (directly to its north, south, east, or west). If there are multiple solutions, you may print any one of them.

#### **Constraints**

 $1 \le T \le 80$ 

 $1 \le R, C \le 3,000$ 

#### **Input Format**

Input begins with an integer T, the number of test cases. For each case, there is first a line containing two space-separated integers, R and C. Then, R lines follow, each of which contains C characters, either "." (an empty space), "^" (a tree), or "#" (a rock), representing the initial painting.

### **Output Format**

For the ith case, print "Case #i: ", followed by "Possible" and R lines of C characters each representing the final painting (if a solution exists), otherwise "Impossible".

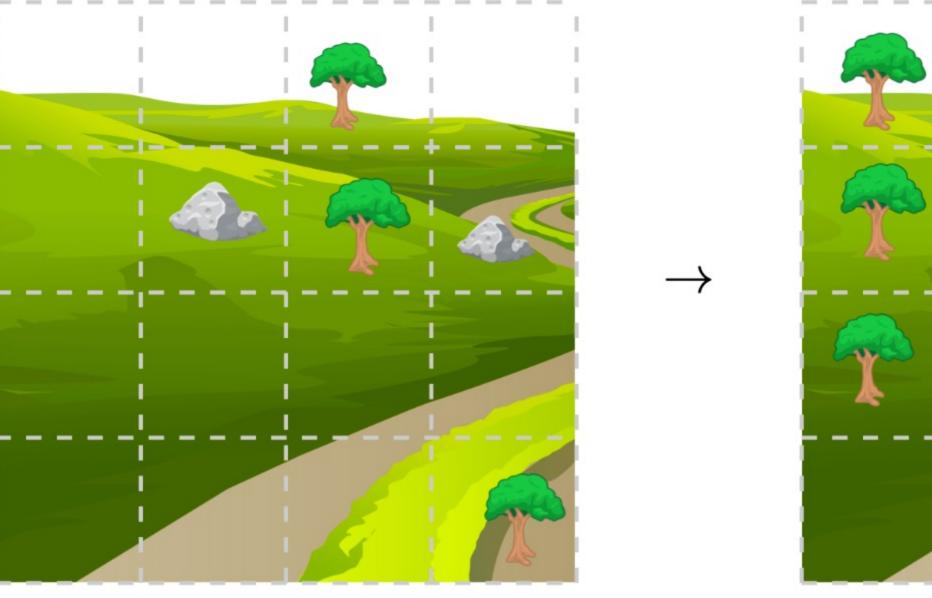
#### Sample Explanation

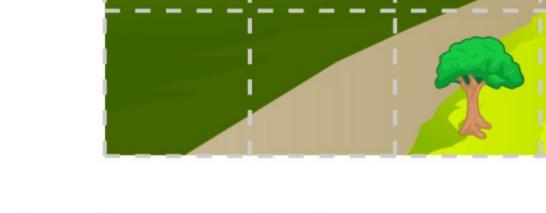
In the first case (depicted below), we could add two tree friends to either side of the middle tree, but they themselves would each only have one tree friend. Therefore, it's impossible to get two friends for each tree in the final painting.



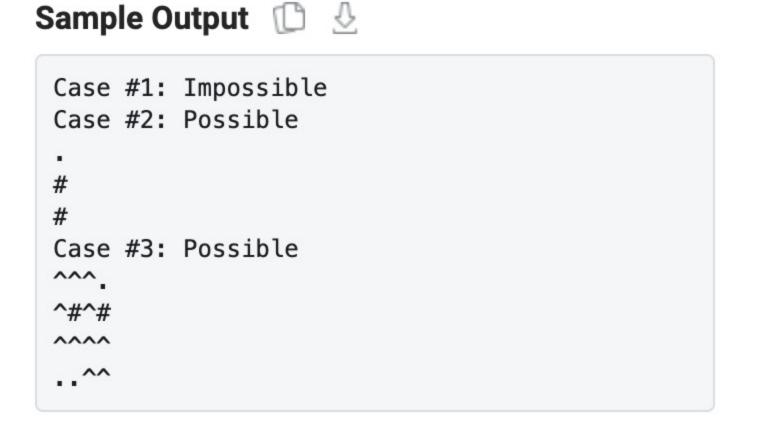
In the second case, there are no trees in the initial painting, so the condition of two friends for each tree is already satisfied.

In the third case, one possible solution is depicted below.





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