Problem 3: Human Instrumentality-inator
5 Points

Problem ID: `scv`

Rank: `1`

Introduction

Disillusioned with the state of the world, Phineas and Ferb have undertaken what they call the "Human Instrumentality Project" as their latest shenanigan. The Human Instrumentality Project entails merging all of mankind's consciousness into one supercomputer, destroying any semblance of individuality and destroying all traces of human physical forms. As part of their trials for this grand plan, they merged their consciousness with that of their laptop computer, trapping them in their ThinkPad. This experiment went horribly wrong—they only shrank down a dimension, still existing in the memory of the laptop but with a reduced physical form. Candace, desperate to snitch, realizes this and begins combing through the laptop's memory to find imprints of their horribly out of proportion heads in the matrix and finally have proof of their schemes.

Problem Statement

You are given an N by M grid as a list of strings $G_1, G_2, ..., G_N$ composed of dots `.` and hashtags `#`. The grid depicts a shape formed by a collection of hashtags. Each grid depicts either a triangle or rectangle, composed of a contiguous section of hashtags. Below are the definitions of each shape:

	Triangle	**Rectangle**

Examples	```. . . . . # # # # .```
	```. . . . . . # # # .```
	```. . # . . . . # # .```
	```. . # # . . . . # .```
	```. . . . .```
		```. # # # . . . . . .```
		```. # # # . . . # # .```
		```. # # # . . . # # .```
		```. # # # . . . . . .```
		```. . . . .```

Properties	Must be an isosceles right triangle Only 90° rotations allowed	Must be a rectangle, but can be a square as well Only 90° rotations allowed
Definition	3 points (vertices) connected by: 1 straight horizontal line 1 straight vertical line 1 straight diagonal line	4 points (vertices) connected by: 2 straight horizontal lines 2 straight vertical lines
Output	`phineas`	`ferb`

Determine whether a given picture contains a triangle or rectangle and output the string `phineas` (if the shape is a triangle) or `ferb` (if the shape is a rectangle) depending on the shape. The picture is guaranteed to always be a triangle or a rectangle.

*Note: Templates are available for this problem—and **all other problems in this contest**—in Python, Java, and C++! Find them in the [contest.zip provided at the start of the contest](). Templates handle input and output for you, so you can just fill out a single function!*

Input Format

The first line of the input contains an integer T denoting the number of test cases that follow.
For each test case:

- The first line contains two space-separated integers N M, where:
    - M denotes the number of rows in the grid.
    - N denotes the number of columns in the grid.
- The next N lines each contain strings of length M. The ith line contains the string G_i denoting the ith row of the grid. Each string consists of only `.` and `#`

Output Format

For each test case, output the string `phineas` if the input contains a triangle, and the string `ferb` if the input contains a rectangle.

Constraints

Time limit: **1 second**
Memory limit: **256 MB**

$1 \le T \le 100$
$2 \le N \le 100$
$2 \le M \le 100$
Each G_i is composed exclusively of the characters `.` and `#`
There will be more than one `#` in G.
The vertices of each shape are guaranteed to fit within the grid.

Sample Test Case

Sample Input   Download

```
6
5 5
.....
.....
..#..
..##.
.....
5 5
#####
#####
#####
#####
#####
3 5
###..
.##..
..#..
8 20
....................
....................
....................
....................
....................
####################
####################
####################
2 2
##
#.
5 5
####.
.###.
..##.
...#.
.....
```

Sample Output   Download

```
phineas
ferb
phineas
ferb
phineas
phineas
```

Sample Explanations

For test case #1, the grid is 5 by 5 and the shape within the grid fits the definition of a triangle, as it has 3 distinct vertices. Thus, the output is `phineas`

```
. . . . .
. . . . .
. . # . .
. . # # .
. . . . .
```

For test case #2, the grid is 5 by 5 and the shape within the grid fits the definition of a rectangle, as it has 4 distinct vertices. Thus, the output is `ferb`

```
# # # # #
# # # # #
# # # # #
# # # # #
# # # # #
```

For test case #4, the grid is 8 by 20 and the shape within the grid fits the definition of a rectangle, as it has 4 distinct vertices. Thus, the output is `ferb`

```
. . . . . . . . . . . . . . . . . . . .
. . . . . . . . . . . . . . . . . . . .
. . . . . . . . . . . . . . . . . . . .
. . . . . . . . . . . . . . . . . . . .
. . . . . . . . . . . . . . . . . . . .
# # # # # # # # # # # # # # # # # # # #
# # # # # # # # # # # # # # # # # # # #
# # # # # # # # # # # # # # # # # # # #
```

For test case #6, the grid is 5 by 5 and the shape within the grid fits the definition of a triangle, as it has 3 distinct vertices. Thus, the output is `phineas`

```
# # # # .
. # # # .
. . # # .
. . . # .
. . . . .
```

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