

Game Gyms

Filename: gyms

Sharon was playing a game where he has to challenge a series of gyms in order to become champion. Each gym has a type, which is super effective against some other types. What Sharon noticed was very interesting; every gym in the series follows a gym that it is super effective against. For example, if the water gym has to be challenged right after the rock gym, it means that water is super effective against rock. Sharon was wondering if for a specific type chart - a chart that shows whether a type is super effective against another - it is possible to create a valid gym ordering. There must be exactly one gym of each type.

The Problem:

Given a type chart, find the lexicographically smallest (alphabetically first) gym ordering such that each gym is super effective against the prior gym in the series, or state that none exist.

The Input:

The first line of the input file begins with a single, positive integer, t , representing the number of type charts. For each type chart, the first line consists of a single integer $2 \leq n \leq 8$. Then, n lines follow. Each line consists of a string of at most 20 uppercase letters, representing the name of the type, followed by n integers, either 0 or 1. No two types will have the same name. The i th integer on that line is 1 if the current type is super effective against type i , in the order given in the input. A type may or may not be super effective against itself. Two types may be super effective against each other. See sample input for more info.

The Output:

For each game, output a single line saying "Type Chart # i :" without the quotes, where i is the number of the type chart, followed by a space and the lexicographically smallest ordering of the gyms, or print "Impossible" if there is none.

(Sample Input and Output are on the next page)

Sample Input:

```
2
6
ROCK 0 0 0 0 1 0
GRASS 1 0 0 0 0 1
POISON 0 1 0 0 0 0
PSYCHIC 0 0 1 0 0 0
FIRE 0 1 0 0 0 0
GROUND 1 0 1 0 1 0
3
ROCK 0 1 0
SCISSORS 0 0 1
PAPER 1 0 0
```

Sample Output:

```
Type Chart #1: FIRE ROCK GROUND GRASS POISON PSYCHIC
Type Chart #2: PAPER SCISSORS ROCK
```