

# Problem 6: It's Better Together?

## 13 Points

Problem ID: `allergy`

Rank: 2

## Introduction

After suffering an unfortunate allergic reaction from a stray cucumber at your local organic farmer's market, you've been worried about what other things you may be allergic to. You didn't want to pay for a skin-prick allergy test, so you decide to go the DIY route—by exposing yourself to potential allergens one-at-a-time while recording any side effects. However, the possibility of suffering through numerous reactions for weeks has you feeling nauseous. Your friend Franjessica suggests another way: grouped-testing—grouping multiple tests into batches, and recording one result for each batch. You can save both time and money; what's not to love?

Your task is to create a program that will output potential allergens given a set of grouped-testing results.

## Program Input

The first line of the input from STDIN will contain a positive integer  $T$  denoting the number of test cases that follow. Each test case will have the following input:

- A first line consisting of two numbers separated by a space. The numbers are as follows:
  - A positive integer  $n$  denoting the number of grouped-tests that will follow.
  - A positive integer  $m$  denoting the number of items that can be tested.
- The next  $n$  lines will each consist of a grouped-test, represented by three values separated by spaces. The values are as follows:
  - A positive integer  $i_{1..n}$  denoting the number of items tested at once.
  - A string representing the result of the test, shown as either `POSITIVE` or `NEGATIVE`
  - A forward-slash-separated list of names  $i_{1..n}$  long, representing the items tested.
- A blank line separating individual test cases.

### Example Input:

```
4
3 4
dish_soap sponges water ceramic_plates
4 POSITIVE dish_soap/sponges/water/ceramic_plates
2 POSITIVE dish_soap/sponges
1 POSITIVE dish_soap

2 4
cardboard_box pizza grated_parmesan crushed_red_pepper
2 NEGATIVE cardboard_box/pizza
3 POSITIVE pizza/cardboard_box/grated_parmesan

1 2
air dust
2 POSITIVE air/dust

4 7
tomato kumquat watermelon jalapeno jackfruit cucumber bell_pepper
3 POSITIVE cucumber/bell_pepper/tomato
3 NEGATIVE jalapeno/tomato/kumquat
3 NEGATIVE bell_pepper/watermelon/jalapeno
3 POSITIVE watermelon/jackfruit/bell_pepper
```

## Program Output

For each test case, your program should correctly output the potential allergens according to the following criteria:

- Your output should be in the format:

```
KNOWN allergens: <ITEM>/<ITEM>/<...>
POTENTIAL allergens: <ITEM>/<ITEM>/<...>
```

- A test shows positive if any one of the items tested is an allergen. A test shows negative if none of the tested items are allergens.
  - Items should only be classified as known allergens if it is impossible for them to be otherwise. An item should be classified as a potential allergen if their status is not guaranteed.

- Names in each list should be sorted in alphabetical order. Underscores should be considered as last in alphabetical order.
- If a classification has no applicable items, your program should insert `NONE` in place of the item list.
- Each test case output should be separated by a blank line.

Example Output:

```
KNOWN allergens: dish_soap
POTENTIAL allergens: ceramic_plates/sponges/water
```

```
KNOWN allergens: grated_parmesan
POTENTIAL allergens: crushed_red_pepper
```

```
KNOWN allergens: NONE
POTENTIAL allergens: air/dust
```

```
KNOWN allergens: cucumber/jackfruit
POTENTIAL allergens: NONE
```

## Problem Constraints

$$T \leq 1.0 \times 10^6$$

$$1 \leq n \leq 1.0 \times 10^5$$

$$1 \leq i_{1..n} \leq m \leq 1.0 \times 10^5$$

Item names will only consist of lowercase letters and underscores.