Letter Flipping

Let's play a game where by taking a starting word and successively altering a single letter we reach the ending word. For instance, the word `spice` can be transformed in 4 steps to the word `stock`: `spice` → `slice` → `slick` → `stick` → `stock`. Each word differs from the previous one in only a single letter with a constant length. Given a dictionary of words from which to make transformations and a list of starting and ending words, the task is to find the no. of steps in the shortest possible transformation.

Input

The first line is the number of test cases, followed by a blank line. Each test case provides the dictionary of words (alphabetic, lower case; up to 200 words; one word per line; no word is longer than 10 letters), terminated by a line containing the asterisk character (`*`). Then each of multiple pairs of words (starting and ending word) is separated by a single space. All pairs are guaranteed to have a transformation using the given dictionary. The starting and ending words appear in the dictionary. Two consecutive input test cases are separated by a blank line.

Output

The output should contain one line per word pair for each test case, and must include the starting word, the ending word, and the number of steps in the shortest possible transformation, separated by single spaces. Two consecutive outputs have to be separated by a blank line.

Input sample

```
1

dip
lip
mad
map
maple
may
pad
pip
pod
pop
sap
sip
slice
slick
spice
stick
stock
*
spice stock
may pod
```

Output sample

```
spice stock 4
may pod 3
```