2016

PROBLEM SET

PREAMBLE

Please note the following very important details relating to input and output:

- Read all input from the keyboard, i.e. use `stdin`, `System.in`, `cin` or equivalent. Input will be redirected from a file to form the input to your submission.

- Do NOT prompt for input as this will appear in your output and cause a submission to be judged as wrong.

- Write all output to the screen, i.e. use `stdout`, `System.out`, `cout` or equivalent. Do not write to `stderr`. Do NOT use, or even include, any module that allows direct manipulation of the screen, such as `conio`, `Crt` or anything similar.

- Output from your program is redirected to a file for later checking. Use of direct I/O means that such output is not redirected and hence cannot be checked. This could mean that a correct program is rejected! You have been warned.

- Unless otherwise stated, all *integers* will fit into a standard 32-bit computer word. If more than one integer appears on a line, they will be separated by white space, i.e. spaces or tabs.

- An *uppercase letter* is a character in the sequence 'A' to 'Z'. A *lower case letter* is a character in the sequence 'a' to 'z'. A *letter* is either a lower case letter or an upper case letter.

- Unless otherwise stated, a *word* or a *name* is a continuous sequence of letters.

- Unless otherwise stated, a *string* is a continuous sequence of visible characters.

- Unless otherwise stated, words and names will contain no more than 60 characters, and strings will contain no more than 250 characters.

- If it is stated that ‘a line contains no more than *n* characters’, this does not include the character(s) specifying the end of line.

- Input files are often terminated by a ‘sentinel’ line, followed by an end of file marker. This line should not be processed.

Please also note that the filenames of your submitted programs may need to follow a particular naming convention, as specified by the contest organisers at your site.

PROBLEM A **PRESENTS** **3 POINTS**

The Bloggs family keep getting invited to birthday parties, and they feel they must buy the person who invites them a present. The trouble is they do not have much money!

The family has come up with a strategy. Whenever they go to a shop to buy a present, they will not buy the cheapest present (that would seem mean!), so they buy the second cheapest gift they can find. Your task here is to help them quickly find the second least expensive gift in the shop.

Input

Input will consist of a single scenario which contains a list of prices from a shop, each on a separate line. The first line will contain N, the number of prices (2 <= N <= 100). No price will be duplicated. The next N lines will each contain a single price in the form of a decimal number with 2 places of decimals (ie dollars and cents).

Output

Output the second lowest price on a line by itself. It must be in the same format as with the input.

Sample Input 1

```
6
62.95
18.50
17.49
26.30
58.95
22.25
```

Sample Input 2

```
8
115.90
129.99
106.95
99.95
136.18
117.85
109.56
99.99
```

Output for Sample Input 1

```
18.50
```

Output for Sample Input 2

```
99.99
```

PROBLEM B **HOLES** **3 POINTS**

Mike wrote some text on a piece of paper and now he wants to know how many holes are in the text.

What is a hole in this context?

If you think of the paper as the plane and a letter as a curve on the plane, then each letter divides the plane into regions. For example letters "A" and "O" divide the plane into two regions so we say these letters each have one hole. Similarly, letter "B" has two holes and letters such as "C", "E", "F" and "K" have no holes. Spaces, of course, have no holes.

We say that the number of holes in the text is equal to the total number of holes in the letters of the text. Help Mike to determine how many holes are in the text.

Input

Input starts with an integer, N, on a line of its own (0 < N <= 30). It tells you how many lines of text follow. There then follow N lines of text. Each line contains a string of text composed only of upper case letters and spaces; it will contain at least 1 letter. The length of the text is no more than 250 characters.

Output

For each line of input, output a single line containing the number of holes in the corresponding text.

Sample Input

```
3
CHEAT CODE
HAVE A CUP OF TEA
NEW ZEALAND
```

Output for Sample Input

```
3
5
3
```

PROBLEM C **OLYMPIC GAMES** **3 POINTS**

The Olympic Games in Rio cannot have escaped your attention! 2016 is a summer Olympics year.

The modern summer Olympic Games were first held in 1896, and have been held at 4 yearly intervals since then, except during the two world wars (1914 to 1918 and 1939 to 1945). The next games are scheduled to be held in Tokyo in 4 years time.

Input

Input will consist of a list of years, one per line, in the range 1860 to 2030 inclusive. The final year will be 0 – do not process that year.

Output

Output is one line per year. The year is given followed by:

`Summer Olympics`	if the summer Olympic Games were held, or are scheduled to be held in that year.
`Games cancelled`	if the summer games should have been held but there was a war.
`No city yet chosen`	if it is a future summer Olympic year but no city has yet been awarded the games
`No summer games`	otherwise.

Sample Input

```
1896
1902
1916
2024
2016
0
```

Output for Sample Input

```
1896 Summer Olympics
1902 No summer games
1916 Games cancelled
2024 No city yet chosen
2016 Summer Olympics
```

PROBLEM D **PALINDROMES** **3 POINTS**

A palindrome is a word, phrase, number or other sequence of characters which reads the same backwards or forwards. Given a string of lower case letters, can you make it a palindrome by deleting exactly one character? Note that the size of the string after deletion would be one less than it was before.

Input

Up to 30 lines each containing from 3 to 30 lower case letters. The final line will just contain # - do not process this line.

Output

If it is possible to make a palindrome from the text by deleting one letter, display the palindrome text. If it is not possible, display `not possible.`

It may be possible to make more than one palindrome by deleting a single letter. For example, `madmam` will become `mamam` if the `d` is deleted, or `madam` if the middle `m` is deleted. In such a case, display the palindrome formed by deleting the earliest letter from the text.

Sample Input

```
radars
rayon
madmam
#
```

Output for Sample Input

```
radar
not possible
mamam
```

PROBLEM E **VIRUS** **10 POINTS**

Shroeder and Patsy heard from a friend whose computer had been attacked by a ransom virus. A nasty message appeared telling their friend that all his files had been encrypted and that it would cost him to have them restored.

Being keen programmers, Shroeder and Patsy, just for fun you understand, wondered how that worked. They tried a simple encryption which would depend of a key which was a single number.

They thought they could use a sort of Caesar cipher (where letters are shifted a number of places through the alphabet which is considered circular so A follows Z). They would start with a shift somewhere between 1 and 25 (the key), then increase it by one each letter. It would cycle round so after 25 would become 1 again.

To decipher, if you know the key it is quite easy, as long as you remember to shift in the opposite direction!

Input

Input consists of a single integer, K, the key, followed by a line of encrypted text. The text will be no more than 250 characters long, and will consist of lower case letters, spaces, digits and punctuation marks only. Only letters are to by encrypted.

Output

Output the line of text correctly decrypted.

Sample Input

```
24
ym fpfvdvaqxx adbpaud xhl odb ldx bheqgul ybzseobczfz wjjqcru.
```

Output for Sample Input

```
an encryption problem for the new zealand programming contest.
```

PROBLEM F **ALPHA PUZZLE** **10 POINTS**

An alpha puzzle is a type of crossword puzzle where each letter square (ie one that is not black) contains a number to represent a letter. Throughout the puzzle, a particular letter is always represented by the same number. All letters of the alphabet are used, so numbers range from 1 to 26.

In this problem you will be given a solution to an alpha puzzle and have to assign numbers to the letters. Some alpha puzzles assign numbers to letters randomly, but the one that appears in the New Zealand Herald every day uses a non-random method which you have to implement.

The answer grid is read left to right, top to bottom; spaces (which represent black squares) are ignored. The first letter encountered is assigned the number 1, the next number 2 and so on. Only the first occurrence of a letter is processed, so only 26 numbers are allocated.

Input

You will be presented with a single puzzle solution which starts with a single integer, S, on a line by itself (10 <= S <=20). S is the size of the puzzle – the number of rows and columns of squares that it contains.

There will then follow S lines, each containing S characters, all upper case letters or spaces. Every letter of the alphabet will appear at least once.

Output

Follow the rules for letter allocation described above then output the 26 letters of the alphabet in their assigned numerical order so that, for example, the first letter is the one to which the number 1 is assigned, the last the one to which 26 was assigned.

[Turn over for sample input and output]

Sample Input

```
13
CITADEL POPPY
H O O U A L I
ARROW MASSAGE
S S N B S C L
SHOULDER BARD
I   O R T T
SQUEAL FRIEZE
  N D A O   X
FILE CLAPTRAP
E U J T I A L
VACCINE CARGO
E K V R A E D
RHYME SPLURGE
```

Output for Sample Input

```
CITADELPOYHURWMSGNBQFZXJVK
```

PROBLEM G **HUNT THE RABBIT** **10 POINTS**

Mr Farkle was brought up on a farm and spent quite a bit of time in his youth hunting rabbits! He now teaches maths and computing, and came up with a hunting game to help his students learn about the binary search.

He put 50 envelopes at the front of the room, numbered sequentially from 1 to 50. Inside one he hid a rabbit – not a real one, of course, just a card with a rabbit picture on it! He then put cards in all the other envelopes so that if an envelope was chosen with a number lower than the one holding the rabbit, the card would read "*Try a higher number*", otherwise the card would read "*Try a lower number*".

Students have to find the rabbit using a binary search, and write down the numbers of all the envelopes they open (in order) during their search. Remember, in a binary search you have to pick the middle envelope in the range you are searching. This is easy to find if there is an odd number of envelopes, but with an even number, you have to choose the lower numbered of the two middle envelopes. That means 25 will always be the first envelope checked.

Input

Each line of input will be a single number in the range 1 to 50 inclusive, it being the number of the envelope in which Mr Farkle has hidden the rabbit. The final input will be 0 which should not be processed.

Output

For each line of input, output the numbers of all envelopes opened, in the order they were opened, until the rabbit is found. Each number must be on the same line separated by a space from the previous number.

Sample Input

```
25
17
31
0
```

Output for Sample Input

```
25
25 12 18 15 16 17
25 38 31
```

PROBLEM H **PARLIAMENTARY RANKINGS** **10 POINTS**

A group of journalists decided it would be quite fun to rank the performance of MPs in parliament each week, and have asked you to write a program to help them.

The journalists were convinced that most MPs did not do very much at all, but came up with a list of codes that would identify actions taken by MPs which they considered noteworthy. They associated points with each action, some positive and some negative. The current table of actions and points follows. If your program is a success and the scheme catches on, more will be added later.

Code	Action	Points
S	Made a speech lasting at least 5 minutes	+10
Q	Asked a question during Question Time	+5
A	Answered a question during Question Time	+7
L	Spent less than an hour in the chamber	-8
F	Made a funny remark that caused laughter in the chamber	+4
D	Made a derisory comment about another party	-5
E	Was asked to leave the chamber	-10

Input

Input will contain data for one week. It will start with a line containing a positive integer N (0 < N <= 120), the number of MPs who attended the debating chamber of parliament in the week in question. There then follow N lines, each giving data on 1 MP. Data will be a unique identifying number, I (0 < I <= 120) followed by a space, followed by the name of the MP.

The list of MPs will be followed by a positive integer, A (0 < A <200), the number of action entries that complete the data. Each of the A lines following will contain data on 1 recorded action of an MP. It will consist of the MP's unique identifying number, followed by a space, followed by one of the letter codes from the table above. The points for each MP have to be added to give their points score for the week.

Output

Output the points score and name of the best scoring MP, and the points score and name of the worst scoring MP each on a separate line. In the case of equal scores, list on the same line all MPs with those scores in order of their unique identifying number, and separated by a space.

Sample Input 1

```
3
1 Bill Bloggs
3 Sara Quentin
2 Jo Jones
4
1 S
2 D
1 L
3 Q
```

Output for Sample Input 1	Explanation
`5 Sara Quentin`	Asked a question during Question Time (+5).
`-5 Jo Jones`	Made a derisory comment about another party (-5).
	Bill Bloggs made a speech lasting at least 5 minutes (+10), but countered that by spending less than an hour in the chamber (-8, total score +2).

Sample Input 2

```
2
1 Joe Smith
2 Sally Baynes
2
1 S
2 S
```

Output for Sample Input 2

```
10 Joe Smith Sally Baynes
10 Joe Smith Sally Baynes
```

Explanation: Both MPs have the same score so are both best scoring and worst scoring.