Old Mutual - CSSA
Computer Olympiad
DAY 2

Overview

Problem	Words Within	Tetrominoes	Sticks
Program name	words.exe	tetro.exe	sticks.exe
Source name	words.pas words.java words.cpp	tetro.pas tetro.java tetro.cpp	sticks.pas sticks.java sticks.cpp
Input file	words.in	tetro.in	sticks.in
Output file	words.out	tetro.out	sticks.out
Time limit per test	5 seconds	5 seconds	5 seconds
Number of tests	5	5	5
Points per test	20	20	20
Total points	100	100	100

The maximum total score for Day2 is 300 points.

Words (100)

Prepared by Donald Cook

Description

The Guji headman enjoys word games. In this particular game players find the number of words within a word. For example the word "understanding" contains under, stand, standing, tan, and, ding. The words must have at least 3 letters and all words must be in the headman's dictionary.

Task

You are required to write a program to help the headman adjudicate the tournaments held in his kraal. The games are played with long multi-syllable words. In some cases the dictionaries are long strings of characters in the range A-Z, all words are in upper case.

Input

The first line of the file 'words.in' contains the word to be searched in uppercase followed by the number of words in the headman's dictionary followed by the words in the dictionary (in uppercase).

Output

The output file, 'words.out', must contain the words in the order they are found from the front of the word. Words that start in the same position must be output in increasing length.

Example

words.in

```
INFORMALLY
1000
A
ALL
ALLY
…
```

words.out

```
INFORM
FOR
FORM
MALL
ALL
ALLY
```

Constraints

The dictionary contains at most 55 000 words. There is a maximum of 100 characters in a word.
The word being searched is guaranteed to be in the dictionary.

Time Limit

Maximum time per test case 5 seconds

Scoring

There will be 10 test cases, each of which will receive a maximum of 10 points.
For each test case the score will be calculated by taking the number of words found as a percentage of the total possible number of words within the target word.

Tetro (100)

Prepared by Carl Hultquist

Description

The Guji tribe has created an extended type of domino that has four numbers instead of the usual two, called a tetromino. When placed on the ground, a tetromino is simply a column of four numbers. The Guji entertainer was quite clever and constructed the tetrominoes in such a way that the numbers can be rotated as is shown below:
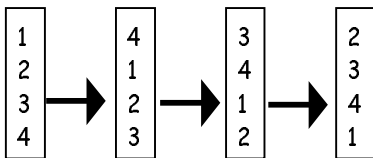
In teaching Guji children a bit of mathematics, a number of tetrominoes are laid next to each other. The children then need to rotate the tetrominoes to make the sum of the 1st and 3rd rows as close to the sum of the 2nd and 4th rows as possible. Furthermore, they then need to work out the smallest number of rotations necessary to achieve this.

Task

The teachers, being lazy, don't want to have to calculate these themselves and have asked you to solve the problem with a computer program.

Input

The first line of 'tetro.in' will contain a single integer, N, specifying the number of tetrominoes which will be laid out. The following four lines describe the initial configuration of the tetrominoes. Each line contains N space-separated integers specifying the corresponding number from each tetromino in their initial configuration.

Output

The first line of 'tetro.out' must contain two space-separated integers, M and R, where M = | row 1 + row 3 - row 2 - row4 | is the smallest difference between the sums of the even and odd numbered rows and R is the number of rotations required. So if you can re-arrange the tetrominoes such that the sum of the 1st and 3rd rows equals the sum of the 2nd and 4th rows, then M = 0. The 2nd line of 'tetro.out' should contain N space-

separated integers specifying the number of times that the corresponding tetrominoes needed to be rotated.

Example

tetro.in

```
4
9 10 7 3
1 2 4 1
8 5 5 5
5 12 6 1
```

tetro.out

```
21
1000
```

Constraints

2 <= N <= 20
1 <= any number on a tetromino <= 100

Time Limit

Maximum time per test case 5 seconds

Scoring

There will be 5 test cases worth 20 points each. A solution, which finds the best difference between the row-sums, as well as the best number of rotations, will score 20 points. An otherwise correct solution will score a fraction of 20 based on how far off the solution was. If a solution does not adhere to the output format, reports a difference in line 1 which is different from that computed by the rotations specified in line 2, or contains a different number of rotations in lines 1 and 2, it will score 0.

Sticks (100)

Prepared by Shaun Nirestein

Description

In deepest Africa there lives a tribe known as the Guji. They believe that fortune may be foretold using a form of numerology. The witch doctor takes a large number of small sticks and throws them on the ground. The number of times a stick falls over/under another, is considered the divined number.

Technology has recently imposed itself on the Guji tribe. The witch doctor now has software, which simulates a set of sticks falling down, and produces as output a set of coordinate pairs, each representing a stick in the ground plane. Due to the brain drain in the country of the Guji, they don't have anyone with the algorithmic skills to write a program to efficiently compute the number of intersections of these sticks.

Task

You have bee contracted to complete this problem. Given a set of line segments (sticks), you must compute the number of segment-segment intersection points, and report back this number. If an end/start-point of one segment lies on that of another, they are said to be touching.

Input:

N
X0 Y0 X1 Y1
X0 Y0 X1 Y1
.
.
X0 Y0 X1 Y1

The first line contains the number of line segments N. The next N lines consist of 4 integer numbers representing the start/end point (X0, Y0) and the start/end point (X1, Y1) of each line segment.

Output:

D   D is in integer, representing the divined number.

Example

sticks.in

```
5
2 2 8 5
3 1 1 3
7 3 3 3
6 2 7 7
1 6 3 6
```

sticks.out

```
4
```

Constraints

You may assume that there will be at most 25000 sticks. You may also assume that no stick will lie vertically (i.e. X0 == X1 never holds). Finally, you may also assume that the stick end/start-points lie on the points of an integer grid. The last two assumptions are due to the uncanny ability of Guji witch doctors to throw sticks in this way.

Time Limit

Maximum time per test case 5 seconds

Scoring

There will be 5 test cases, each of which will receive a maximum of 20 points.
For each test case the score will 20 or 0.