# A. A String Problem

| Problem Name | A String Problem |
|---|---|
| Time Limit | 2 seconds |
| Memory Limit | 1 gigabyte |

Last Saturday, there was the Rheinaue-Flohmarkt in تحب لارا أسواق السلع المستعملة. Lara loves flea markets Bonn, one of the biggest flea markets in Germany في السبت الماضي، كان هناك سوق رايناو فلوه في مدينه بون، وهو أحد Of course, Lara spent the whole day there, strolling through the market, أكبر أسواق السلع المستعملة في ألمانيا. haggling over prices, and buying all kinds of curious things.

وبالطبع، قضت لارا اليوم كله هناك، تتجول في السوق و تساوم على الأسعار وتشتري كل أنواع الأشياء الغريبة. The most interesting thing she brought home was a small harp in a perfectly circular shape أكثر ما أثار اهتمامها في السوق هو قيثارة صغيرة دائرية الشكل تمامًا اشترتها وأحضرتها إلى المنزل. When she wanted to start playing it, she noticed that the strings were all over the place rather than being parallel to each other.

عندما أرادت البدء بالعزف عليها، لاحظت أن أوتارها كانت مربوطه بشكل خاطى بدلاً من أن تكون متوازية مع بعضها البعض.
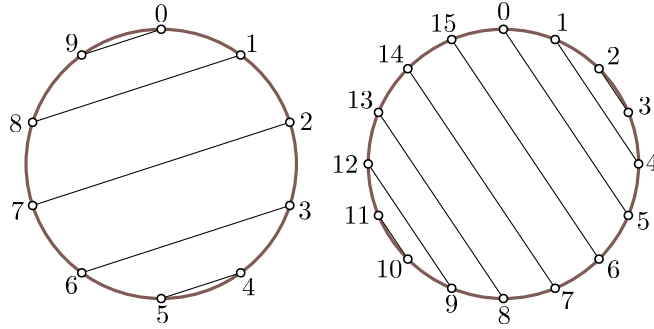
وبشكل أكثر تحديدًا، More specifically, there are $2 \cdot N$ pins distributed evenly around the circular frame اذاكان هناك N من الاوتار فان هناك $2 \cdot N$ من الدبابيس موزعة بالتساوي حول الإطار الدائري. Each of the $N$ strings is held in place by two of the pins, and at every pin, there is exactly one string attached كل وتر من الأوتار الـ $N$ مثبت في مكانه بواسطة دبوسين، وعند كل دبوس، يوجد وترواحد فقط متصل به.

Lara does not know much about harps, but she strongly suspects that the strings should be aligned so that they are parallel to each other. لا تعرف لارا الكثيرعن القيثارات، لكنها تعتقد بشدة أنه يجب محاذاة الأوتار بحيث تكون متوازية مع بعضها البعض.

To fix this issue, she decides to restring the harp لحل هذه المشكلة، قررت لارا إعادة ربط أوتار القيثارة. In each step, she can detach one end of a string from its pin and reattach it to a different pin في كل خطوة، يمكنها فصل أحد طرفي الوتر عن دبوسه وإعادة ربطه طرفه بدبوس اخر.

During the process it is okay if the ends of multiple strings are attached to the same pin. In the end, there should be exactly one string attached to every pin once again, and the $N$ strings should be parallel to each other. خلال الحل لا بأس بربط أطراف أوتار مختلفه بنفس الدبوس. ولكن عند انتهاء الحل، يجب أن يكون هناك وتر واحد متصل بكل دبوس، ويجب أن تكون الأوتار الـ N متوازية.

Below you can find two examples of harps with parallel strings. فيما يلي مثالان على قيثارتين بأوتار متوازية.

Since each step of restringing is a lot of work, Lara wants to restring the harp with as few steps as possible. تتطلب كل خطوة من خطوات إعادة الأوتار جهدًا كبيرًا، لذلك ترغب لارا في إعادة أوتار القيثارة بأقل عدد ممكن من الخطوات. Help Lara find a restringing sequence that takes the minimum number of steps ساعدي لارا في إيجاد سلسله إعادة أوتارفي اقل عدد من الخطوات!

## Input

The first line of input contains one integer $N$, denoting the number of strings. The strings are numbered from 0 to $N - 1$.

Then follow $N$ lines, where the $i$th line ($0 \le i \le N - 1$) contains two integers $a_i$ and $b_i$, the two pins that hold the $i$th string in place. The pins are numbered in clockwise order from 0 to $2 \cdot N - 1$. At every pin, there is exactly one string attached.

## Output

Output an integer $K$, the minimum number of steps needed to restring the harp such that all strings are parallel to each other.

Further, output $K$ lines, each containing three integers $p$, $s$, and $e$, denoting that in this step of your solution, one end of string $p$ should be detached from pin $s$ and reattached to pin $e$ ($0 \le s, e \le 2 \cdot N - 1$ , $0 \le p \le N - 1$).

Note that if the $p$th string is not attached to pin $s$ at that moment, the verdict is Wrong Answer.

If several answers exist, you may print any of them. Note that partially correct answers may still score some points, as explained in the next section.

## Constraints and Scoring

- $4 \le N \le 100\,000$.
- $0 \le a_i, b_i \le 2 \cdot N - 1$.
- All $a_i$ and $b_i$ are unique.

Your solution will be tested on a set of test groups, each worth a number of points. Each test group contains a set of test cases. For each test group, your points are determined as follows:

- If your program solves all test cases in the test group, you get $100\%$ of the points.
- If your program does not fully solve the test group but **it correctly outputs the minimum number of steps for each of them**, you get $50\%$ of the points.

When determining whether your solution scores $50\%$ of points for a test group, only the value $K$ it outputs is judged. The solution can just output the value $K$ and terminate, or it can even output an invalid sequence of moves. Note that your solution still has to finish within the time limit and terminate correctly.

| Group | Score | Limits |
|-------|-------|--------|
| 1 | 14 | String $i$ is attached to pins $2 \cdot i$ and $2 \cdot i + 1$ for all $i$ |
| 2 | 16 | The number of steps needed is at most $2$ |
| 3 | 12 | It is guaranteed that there is a solution where one string is attached to pins $0$ and $1$ |
| 4 | 28 | $N \leq 1\,000$ |
| 5 | 30 | No additional constraints |

# Examples

In the first sample, we are given a harp with five strings. In the first step, string 4 is detached from pin 8 and reattached to pin 9. In the next step, string 0 is detached from pin 5 and reattached to pin 8. In the last step, string 1 is detached from pin 9 and reattached to pin 5. Now, there is exactly one string attached to each pin, and all strings are parallel to each other. This sequence is shown in the figure below.
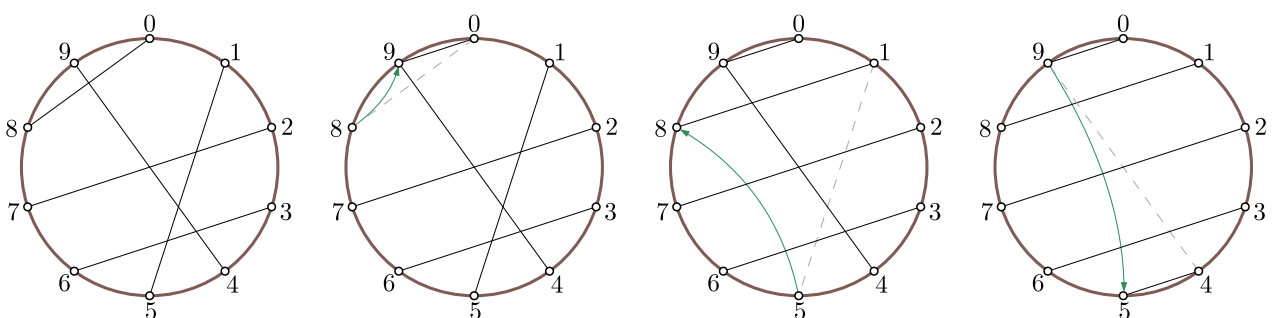


The figure below shows the initial state of the harp for samples 2, 3, and 4.
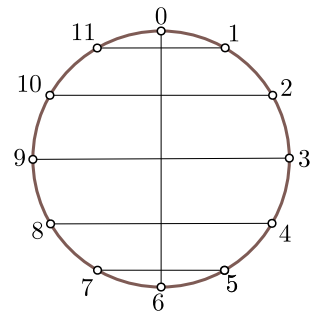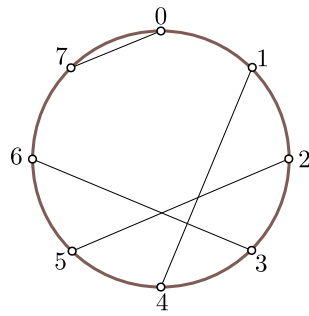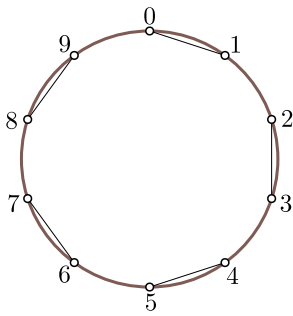
- The first sample satisfies the constraints of test groups 4 and 5.
- The second sample satisfies the constraints of test groups 1, 3, 4, and 5.
- The third sample satisfies the constraints of test groups 2, 4, and 5.
- The fourth sample satisfies the constraints of test groups 3, 4, and 5.

| Input | Output |
|---|---|
| 5<br>1 5<br>4 9<br>6 3<br>2 7<br>0 8 | 3<br>4 8 9<br>0 5 8<br>1 9 5 |
| 5<br>0 1<br>3 2<br>4 5<br>6 7<br>9 8 | 4<br>1 3 9<br>4 9 3<br>2 5 7<br>3 7 5 |
| 4<br>1 4<br>6 3<br>5 2<br>7 0 | 2<br>0 4 6<br>1 6 4 |
| 6<br>3 9<br>7 5<br>10 2<br>0 6<br>1 11<br>8 4 | 6<br>3 6 1<br>4 1 2<br>2 2 3<br>0 3 4<br>5 4 5<br>1 5 6 |