Algorithmics	Student information		Date	Number of session
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Activity 1. Answer the following questions

- *Briefly explain how your algorithm works*

First of all, I get the colors and countries (with its respective adjacent countries) reading the text files using the two methods readColors() and readCountries(), and store them in two ArrayLists (one of type String for the colors and another one of type Country for the countries).

Second, the algorithm is applied to the list of countries. I first iterate through the list of countries. For every country I create a list where the colors of its adjacent countries will be stored.

Then, I iterate through the list of adjacent countries in order to get all their colors and store them in the previously mentioned list. But before doing this last thing, as the adjacent countries are objects that only have as attribute the name, I first must get the real country reference in the main list of countries. That's why I do a third loop.

When the second loop ends, I have a list with all the colors of the adjacent countries. Now, by knowing the colors I can't use, I iterate through the main colors list and get the best possible color to give to the country.

- ***How many colors did you need to use to solve the problem?***

I implemented the algorithm in a way that the method colorate() returns the total amount of colors used. According to the output of the function:

```
Colors used:
Rojo
Azul
Verde
Amarillo
Negro

Amount of colors used: 5
```

We can conclude that I needed 5 colors to solve the problem.

- ***May the number of colors change if you use a different order for the countries to be processed by your algorithm?***

No, the number of colors wouldn't change because we would have the same amount of countries but in different order.

- ***How many colors would be used in an optimal solution at most?***

In an optimal solution, according to the Four-Color Theorem, four colors would be enough to solve this map.

- ***What is the time complexity of your algorithm? Briefly explain it.***

As explained in the first question, we have three nested loops.

➔ The first one, with complexity O(n) to iterate through the list of countries.

➔ The second one, with complexity O(n) to iterate through the list of adjacent countries.

➔ The third one, with complexity O(n) to iterate again through the list of countries.

As a result of these three nested loops all with complexity O(n), we get that the time complexity of the algorithm is the multiplication of the three complexities, that is:

n * n * n = n³ → **O(n³)**