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

1. Briefly explain how your algorithm works.

The "MapsColoring" class is in charge of reading from the files where the colors and the country's information is stored to configure and color the map.

Once the input information is read from the files, the initial state of the algorithm is based on a list and two dictionaries:

- The world dictionary, where each country is stored, along with all of its frontiers, the size of this bidimensional array is the total amount of countries by its frontiers.
- The colors list, where all the possible colors are stored. The size of this array is not important for the problem as it fixed and doesn't increase with the size of the problem.
- The map dictionary stores the color of each country on the map. This collection starts empty and ends with the same size of the countries.

The algorithm iterates through all the elements, countries, stored in "world" one time to ensure that all countries are colored. However, another two iteration through the frontiers and through the already colored countries are required to guarantee that the same color is not repeated in two countries that share a border.

2. How many colors did you need to use to solve the problem?

My solution is performed with 5 colors.

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

If the countries with a greater number of frontiers that are related where ordered, the number of colors would be optimal.

4. How many colors would be used in an optimal solution at most?

The optimal solution would be 4 colors.

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

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To calculate the complexity of the algorithm, it is necessary to consider all the sizes of the arrays:

- The total number of colors that are available is not important, moreover, the number of colors used will multiply the number of frontiers (c).
- The total number of frontiers will be consider every time the colors have to be checked (f).
- The main size of the problem is the total number of countries (n).

Considering all of this, the overall complexity of the problem will be O(number of countries) and O(colors * total number of frontiers), therefore 0(n + c * f).