Activity 1. Basic recursive models

1- Answer the following questions

a. Briefly explain how your algorithm works

First, I created a class that allows me to read the colors and countries from the file we got. Then I created a method that, with these colors and countries will make the coloring.

On the method first I define a variable checker to know when I must break a loop If I find a color available.

I have on the method 3 loops, one for the countries, another for the colors and another to iterate through the neighbors.

The way this works is the following, first the loop picks a country, then it starts to iterate through all the colors, it picks a color and check if you already found a color for this country. If the checker is not activated, it sets this color to the country and starts to check all the neighbors to check if the color is in any of them. If the color is already on a neighbor, the loop will set the checker to false and break to set another color and do another time the checker. If none of the neighbors have this color the checker will be set to true and when we finish checking all the countries and go back to the color loop, we will enter in the checker if that causes the loop to break and go ahead to the next country in the list.

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

In my algorithm I use 6 colors

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

It is possible because if the countries are set in a different order there will be neighbors that there are without color before and now, they have a color making the algorithm to iterate in a different way through the loop

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

4 colors at most

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

The complexity is O (V^2 + E) being the V the vertex of the graph and E the edges of the graph