**The individual assignment (till the end of the 7th week)**

**The task 1 (10 points)**

First problem we investigate in this assignment is the map coloring problem. The goal is to color a map such that no countries on the map that share a border are assigned the same color. The number of colors is limited. For the purpose of assignment assume you have a map with 10 countries and you have three different colors: Green, Red and Blue.

**Part a.** Formulate the map coloring problem as a (graph) search problem by defining its initial state, operators and the goal condition.

**Part b.** What is the search space size of your formulation? If the exact calculation of the search space size of your formulation becomes hard, give a reasonable upper bound estimate.

You need to take a map with several countries and paint them with different colors keeping the stated conditions.

Then you need to write the formula for finding the total number of possibilities to put the color on the map.

Start like. Suppose there are n number of countries, and r number of colors (in this particular problem, n=10 and r= 3). At the 1st stage, any one country is picked, and colored with any one of the r colors. Thus, there are r possibilities at this stage. In the next level, we pick the adjacent country, and there are r possibilities at this stage, for every one of the color selection in the previous stage. Thus, there are r2 possibilities at this level. And so on.

**The task 2 (10 points)**

Consider the following graph representing road connections between different cities. Let S be the initial city and G the destination.



Part a. Show how the depth-first search with the elimination of cyclic repeats would search

the graph.

Part b. Show how the breadth-first-search would search the graph. Assume we use the breadth-first search that checks for and prevents cyclic repeats only.