Assignment 2

Written Assignment - Constraint Satisfaction Problem

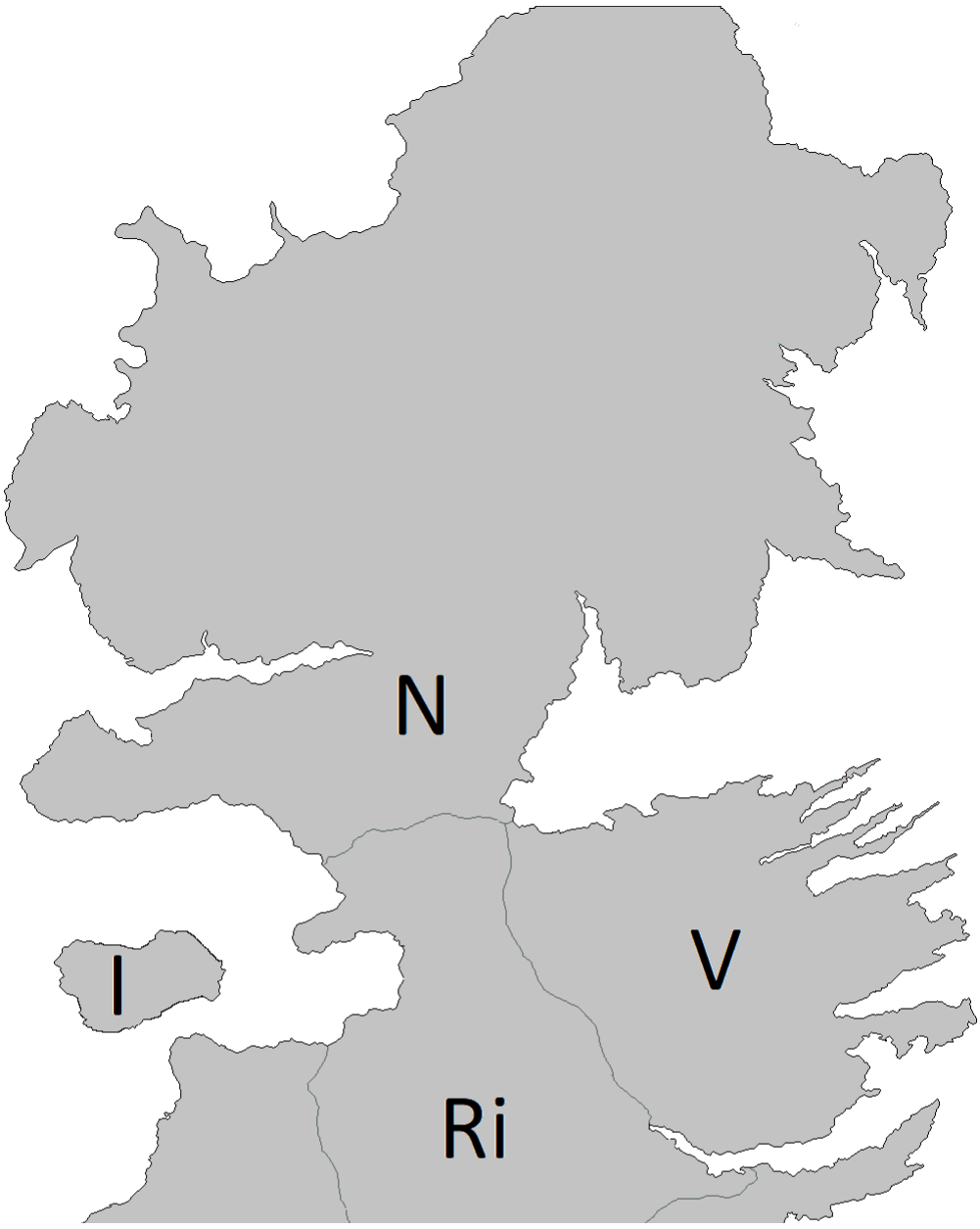
Max possible score:

- 4308: 50 Points (+5 Points EC)
- 5360: 50 Points (+5 Points EC)

Task 1

Max: [4308: 42 Points (+5 Pts EC), 5360: 42 Points (+5 Pts EC)]

Consider the following map.



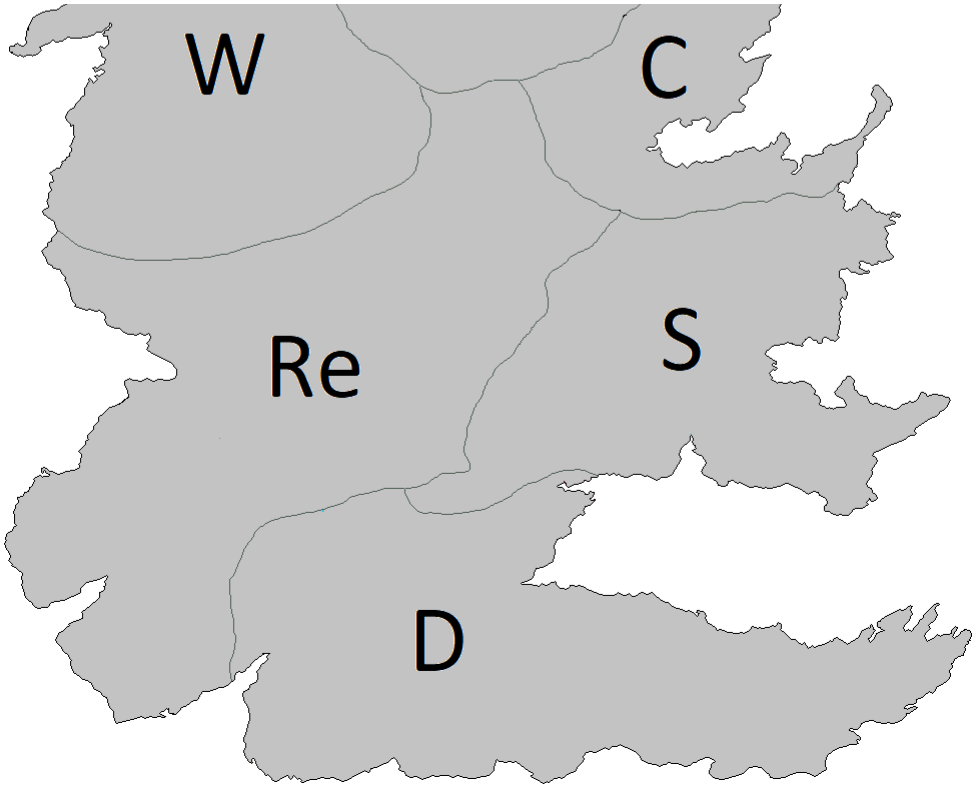


Figure 1. Outline of a Map

The problem is to color the sections such that no two sections sharing a border have the same color. You are allowed to use the colors (Red, Green, Blue).

Part a (8 points): Draw the Constraint Graph for this problem.

Part b (15 points): Assuming you are using Backtracking search to solve this problem and that you are using both MRV and Degree heuristic to select the variable, Which variable will be selected at each level of the search tree [You do not need to draw the tree. Just let me know which variable will be selected and why (MRV and degree values)]. Note: Multiple possible correct answers. You only have to give one.

Part c (15 points): Assume you assign the color 'Red' to the first variable selected in part b. Show the steps involved in checking the remaining legal values for all other variables using Arc Consistency.

Part d (4 points): Can you use structure of the problem to make solving it more efficient?

Part e: (5 points EC): Give one valid solution to this problem. (You just have to give the solution. No need to give all the steps)

Task 2

Max: [4308: 8 Points, 5360: 8 Points]

For the given cryptarithmetic problem, draw the constraint graph.

$$\begin{array}{cccccc} & & S & E & N & D \\ + & & M & O & R & E \\ \hline = & M & O & N & E & Y \end{array}$$

Figure 2. Cryptarithmetic Problem