CS1571
Fall 2019
9/11 In-Class Worksheet

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Where were you sitting in class today: Left towards the backish

A. Constraint Satisfaction Problems

1. Based on the formulation below, describe the problem in natural language.

Variables = {WA, NT, Q, NSW, V, SA, T}
Domains D_i = {red, green, blue}
Constraints: {WA != NT, SA != NT, NT != SA, NT != Q, Q != NSW, NSW != V}

Based on the formulations above, this is a color mapping problem in which no adjacent or bordering states can be the same color. So for this specific problem, the variables represent the states and all the states have the same initial domain (red, green, blue). What this problem does is list all the bordering states and shows that they cannot be the equal which would be the constraints for all the actions that can be taken.

2. Below is a constraint satisfaction problem where you map unique numbers to letters such that they satisfy an arithmetic example. How would you formulate this problem?

```
      CP
+     IS
+    FUN
--------
=   TRUE
```

Variables = {C, P, I, S, F, U, N, T, R, E} {Carry1, Carry2, Carry3}

Domains = letters: {0, 1, 2, 3, 4, 5, 6, 7, 8, 9} carries: {0,1,2}

Constraints = {P+S+N=E+10*Carry1, alldiff(letters), Carry1 + C + I + U = 10 * Carry2 + U}