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CS580
HW2

1.) Map Coloring:

Results: Four Methods of Solving, outlining the number of assignments to reach the solution

Run:	LCV	MRV	Forward Arc Consistent	AC3
Australia	6	6	6	6
France	21	21	21	21
USA	49	7004	49	49

While coloring the maps with the above methods LCV, Forward Checking, and AC3 would perform the same number of assignments for any number of runs. The outlier was MRV Backtracking which would struggle with the larger maps of France and the USA.

2.) Map Coloring with Cutset Conditioning:

The method to be implemented for coloring the maps is to color the cutset, then remove the colors assigned to the cutset from the domains of the nodes in the tree who's neighbors are within the cutset, until a solution is able to be found.

To solve this problem I implemented three methods: cutset_conditioning(), solve_cutset(), and solve_tree(). The first method calculates and displays the states found within the cutset, and those that make up the tree, by implementing the algorithm provided in Cutset.pdf. It then orchestrates calls to solve the cutset followed by a call to solving the tree and the combination of the solutions is then printed. I was able to produce the cutset and resultant tree, and the maps were able to be colored successfully.

3.) Sudoku, N-Queens (n > 1000), Zebra, and Ships:

Below are the following number of assignments for the four games:

Sudoku: Easy [81], Hard [262] – Forward Checking
N-Queens: 1116 – Minimum Conflicts
Zebra: 108 – Forward Checking
Ships: 30 – Forward Checking

For the problem similar to Zebra, I chose to implement Ships:

The Ship Puzzle
rules can be found at: http://brainden.com/einsteins-riddles.htm
There are 5 ships in a port.

The Greek ship leaves at six and carries coffee.
The ship in the middle has a black chimney.
The English ship leaves at nine.
The French ship with a blue chimney is to the left of a ship that carries coffee.
To the right of the ship carrying cocoa is a ship going to Marseille.
The Brazilian ship is heading for Manila.

Next to the ship carrying rice is a ship with a green chimney.
A ship going to Genoa leaves at five.
The Spanish ship leaves at seven and is to the right of the ship going to Marseille.
The ship with a red chimney goes to Hamburg.
Next to the ship leaving at seven is a ship with a white chimney.
The ship on the border carries corn.
The ship with a black chimney leaves at eight.
The ship carrying corn is anchored next to the ship carrying rice.
The ship to Hamburg leaves at six.

Which ship goes to Port Said? Which ship carries tea?
Solution should be a variation of (rows should hold these values):

French	Five	Tea	Blue	Genoa
Greek	Six	Coffee	Red	Hamburg
Brazilian	Eight	Cocoa	Black	Manila
English	Nine	Rice	White	Marseille
Spanish	Seven	Corn	Green	PortSaid

I was able to find solutions for all four games.