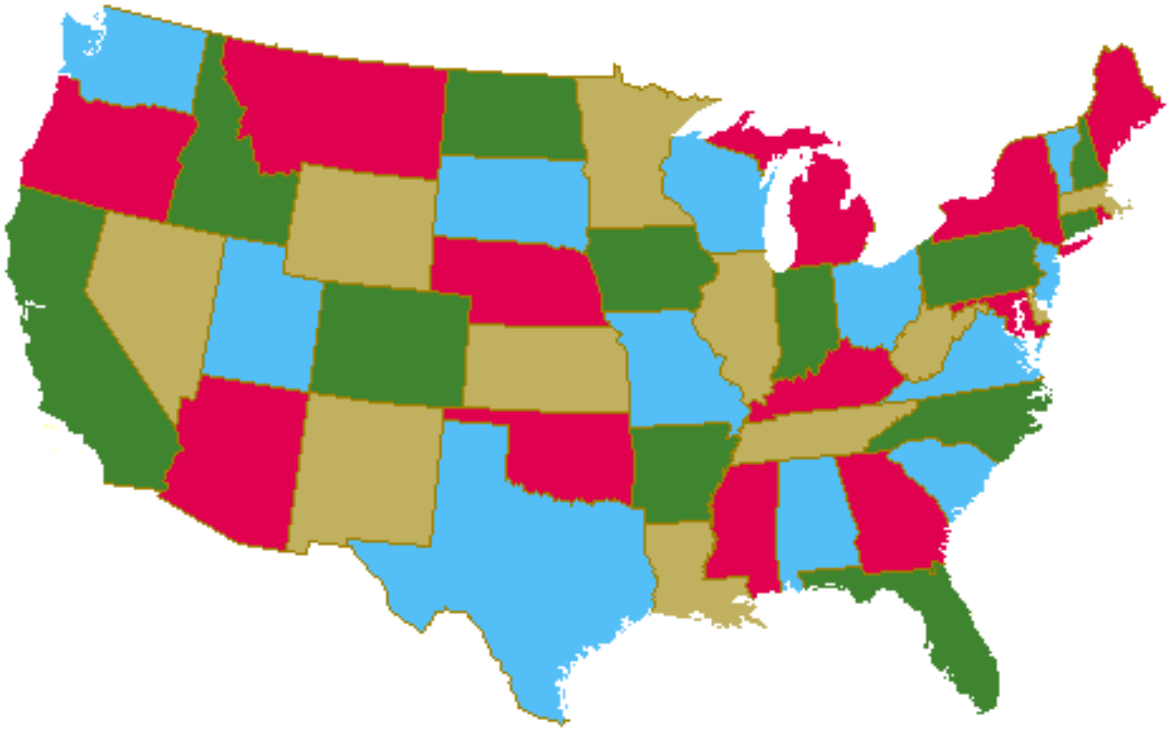
Assignment 3
Due Friday Sept 24

1. The four color *problem* (that a map can be colored using just 4 colors) can be traced back to 1852. However, after many attempts, the theorem was finally proven at the University of Illinois 1976. It was the first theorem to be proven using a computer. You can read about the four color theorem and its history at

http://www.math.gatech.edu/~thomas/FC/fourcolor.html

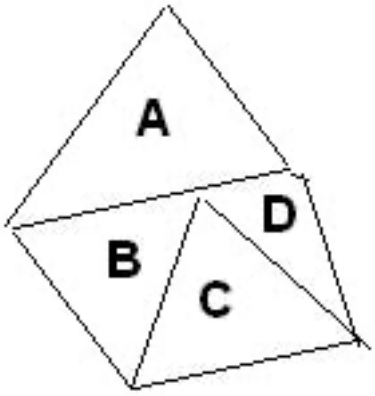
The problem at hand is to color the map of the US (as represented by its adjacency matrix) using just four colors, say red, green, yellow, and blue, just like the map on the above website, although not necessarily the same color assignments:



You should use a recursive backtracking algorithm as in the 8 queens problem.

Here is a table showing which state borders another, including Washington DC. The URL is http://web.stonehill.edu/compsci/CS211/Assignments/usmap.txt

For example, if there are just four states A,B,C,D and the map is:



The table or matrix would be:

	A	B	C	D
A	0	1	0	1
B	1	0	1	0
C	0	1	0	1
D	1	0	1	0

This matrix can be interpreted as "A borders on B and D (look for the 1's); B borders on A and C; C borders on B and D; D borders on A and C."

This array is called the **Adjacency Matrix** for the map.

Your output should be similar to

Maine red
New Hampshire green
Vermont blue

The order of the states is not important.

The backtracking algorithm that we used for the 8 queens will work for this problem.
Instead of a method

placeQueen(int row)

you should have a method

colorState(int state)

Rather that saying

for each column 0 to 7

You can say

for each color 1 to 4

The difference is whether a position is safe or whether a color is safe/available.

Call your main class FourColor.java

0 0 1 0 1

2. Suppose that you have a binary string--that is a string of all 0's and 1's. Write a program using a stack but no arithmetic to determine whether the number of 0's is equal to the number of ones. When these counts are not equal your program should determine which character occurs more frequently. Your program should not count the number of 0s and 1s

Your program should continually prompt for a string until the user enters xxx

Example:

Enter a string: 00101010
0 occurs more frequently

Enter a string: 101010101100
Equal number of 0s and 1s

Enter a string: 1010101101100
1 occurs more frequently

Enter a string: xxx
ByeCall the class Counter.java