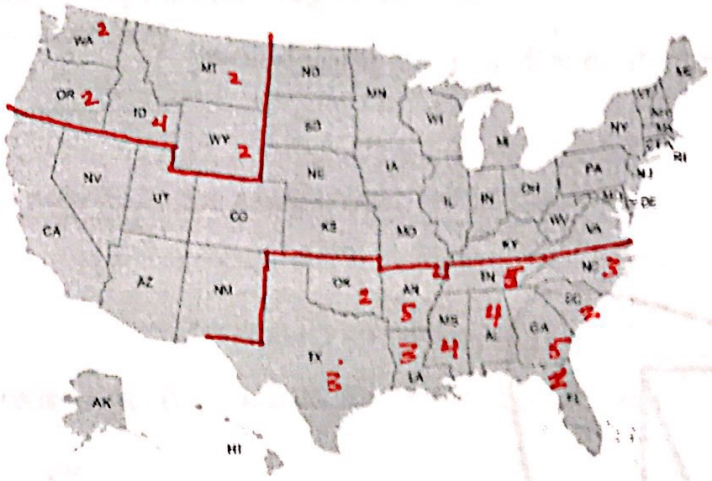
Unit 8 – WS #2

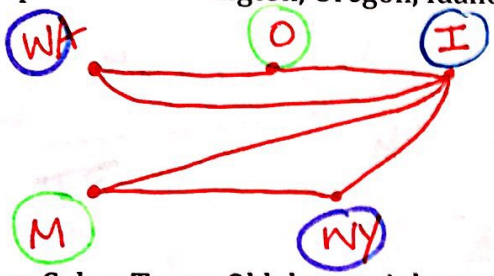
Name _____

1. Use the map of the United States to represent each group of states with a graph. Recall that the vertices representing two states will be joined by an edge if and only if the states share a common border.



a. Map Color: Washington, Oregon, Idaho, Montana and Wyoming.

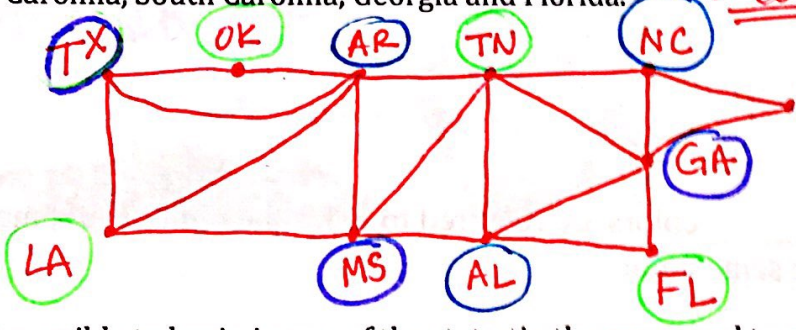
3 colors



Blue: Idaho
Green: Oregon, Montana
Purple: Washington, Wyoming

b. Map Color: Texas, Oklahoma, Arkansas, Louisiana, Mississippi, Alabama, Tennessee, North Carolina, South Carolina, Georgia and Florida.

3 colors



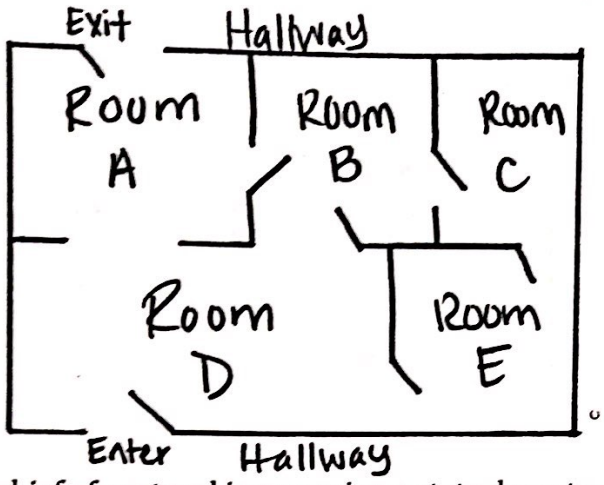
Blue: AR, AL
Green: TN, SC, FL, LA, OK
Purple: TX, MS, GA

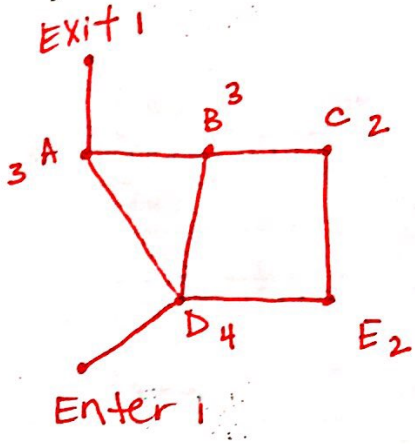
2. Is it possible to begin in one of the states in the group and travel through all of the states without ever crossing the same boundary between two states twice?

in #1a: Yes. There are no "odd" states/vertices. making #1a traceable (and it will begin and end in the same state)

in #1b: NO. There are 4 "odd" states/vertices. Graphs are only traceable if there are zero or 2 odd vertices.

3. The following is a floor plan of a suite of offices. Assume all the doors indicated are open. Is it possible for a security guard to enter the suite from the hallway, pass through each door locking it behind him, and then exit without ever having to open a door that has been previously locked? (Hint: Model this with a graph where you consider the set of objects to be the rooms and the hallway and that any two rooms are related if they are connected by an open door.)

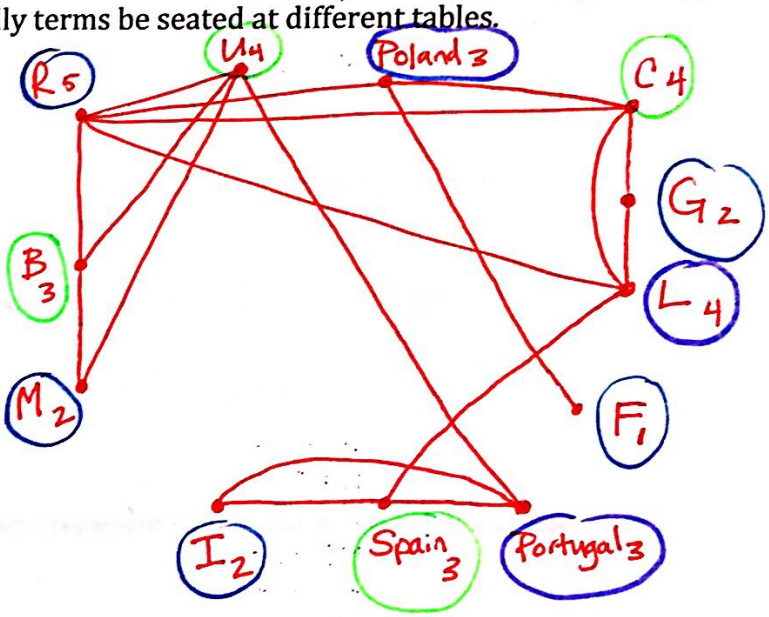




NO – There are 4 "odd" Rooms

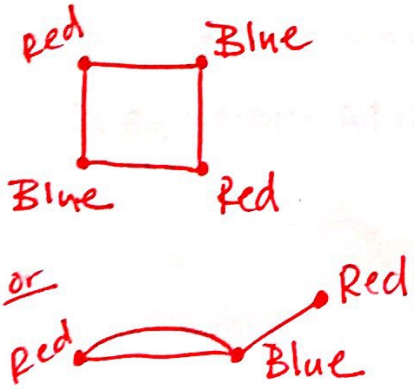
4. The chief of protocol is arranging a state department luncheon for the ambassadors of 12 countries. It is important that ambassadors not on friendly terms be seated at different tables.

Ambassador from	Is not friendly with Ambassador from:
~~Russia~~	~~US~~, Poland, Canada, ~~Latvia~~, ~~Britain~~
Germany	Latvia, Canada
~~Mexico~~	~~US~~, ~~Britain~~
~~Italy~~	~~Spain~~, Portugal
~~Poland~~	Canada, ~~France~~
~~Britain~~	~~US~~
~~Latvia~~	~~Spain~~, Canada
~~Portugal~~	~~Spain~~, US



3 tables: Blue (Russia, Mexico, Italy, France, Germany) Green (US, Canada, Spain, Britain) Purple (Poland, Portugal)

5. Draw a graph that can be colored with only two colors.



6. Draw a graph that cannot be colored with two colors but can be colored with three. Can you state what configuration of vertices will force us to use at least three colors in coloring a graph?

4 or more vertices with:
- 2 odd vertices
- Both odds must share an edge.