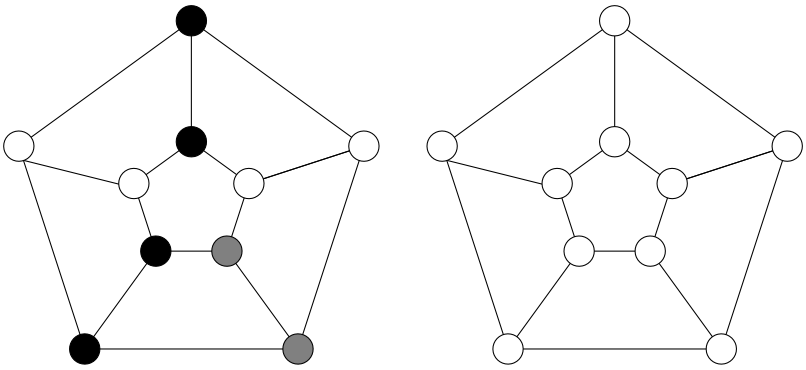
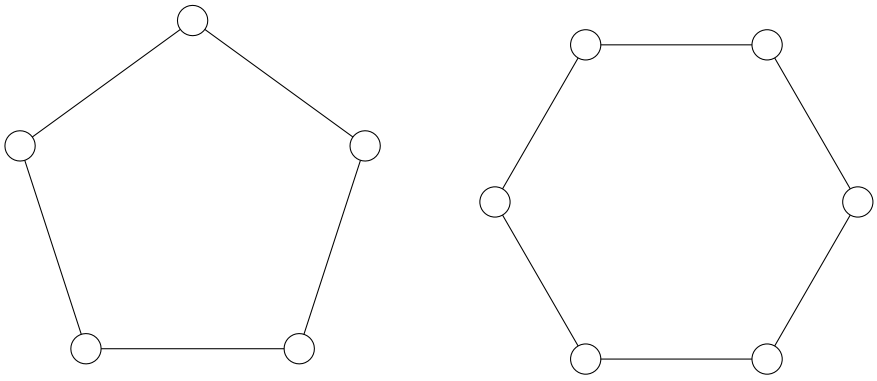
Part One: Coloring Graphs

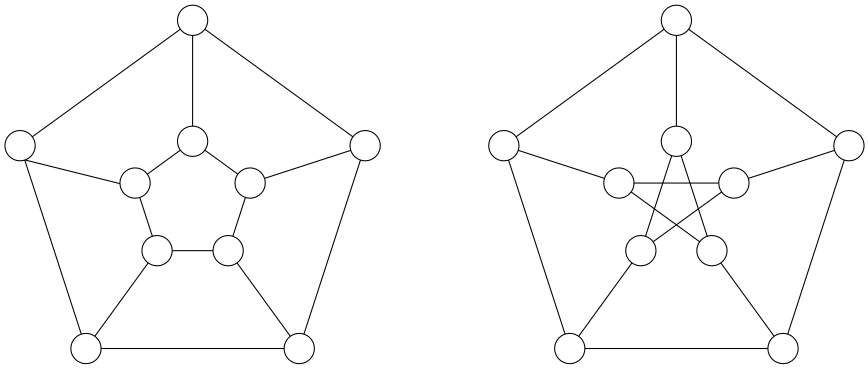
Remember, the *chromatic number* of a graph is the least number of colors needed to *properly* color the vertices!

1. Below (on the left) is a graph that has been 3-colored, but it is not a proper coloring. Explain why, and then find a proper 3-coloring on the other copy of the graph (on the right).

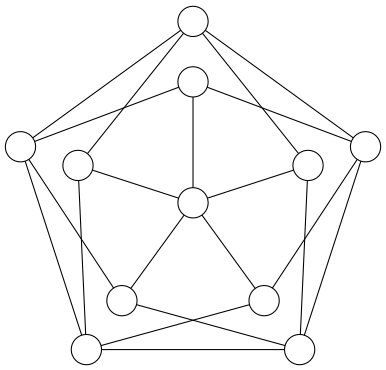


2. For each of the following graphs, find a proper coloring that uses as few colors as possible. Can you explain why that really is the graph's chromatic number?

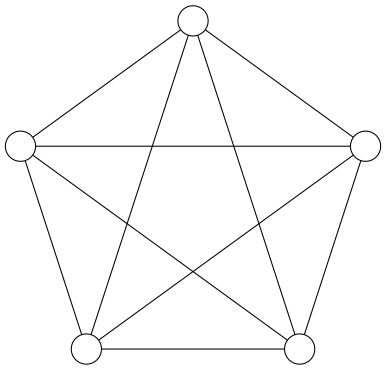




3. In the graph below, each vertex represents a class offered in the Spring 2013 semester. Two vertices are adjacent if and only if there is a student who is taking both classes. How many final exam timeslots are needed?



4. The *complete graph* K_n has n vertices and every possible edge. What is the chromatic number of K_n? (Below is a picture of K_5).



5. If my graph has a copy of K_4 in it (we call this a *subgraph*) then of course my graph has chromatic number at least 4. Is that the only way for a graph to have chromatic number 4?

Part Two: Coloring Maps

Properly color the following maps with as few colors as you possibly can.