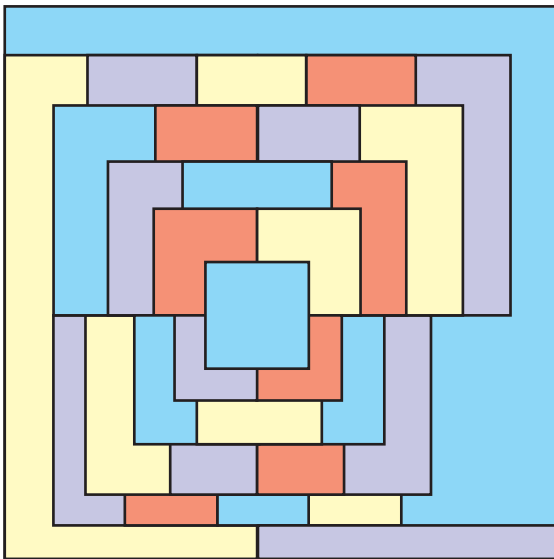# Beauty of Mathematics Decal PSET #6

Due 10/25

1. Color the following map using only four colors. (This map is adapted from a bigger one by Martin Gardner, which he used as an April Fool's hoax to claim a counterexample to the four color theorem.)

   There are many ways, of course; here's an example.

2. Color the following graph using only four colors.

   Again there are many ways, and here's an example.
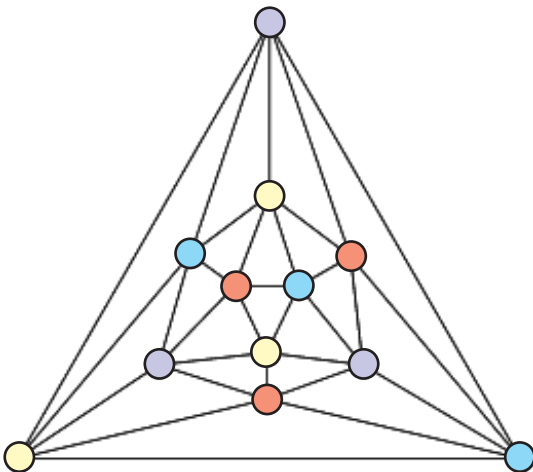
3. Draw a graph that can't be colored with four colors. (Remember that the four color theorem only applies to planar graphs, that is, graphs that can be drawn without any edges crossing.)

We proved in class that every planar graph can be colored by four colors. In order to draw a graph that can't be colored with four colors, it had better not be planar, so we're gonna need some edges crossing. Perhaps the simplest way is to draw five vertices and connect them all. This requires five colors, because all five vertices are connected to each other.