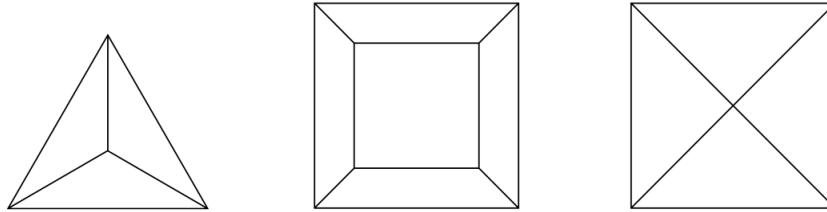
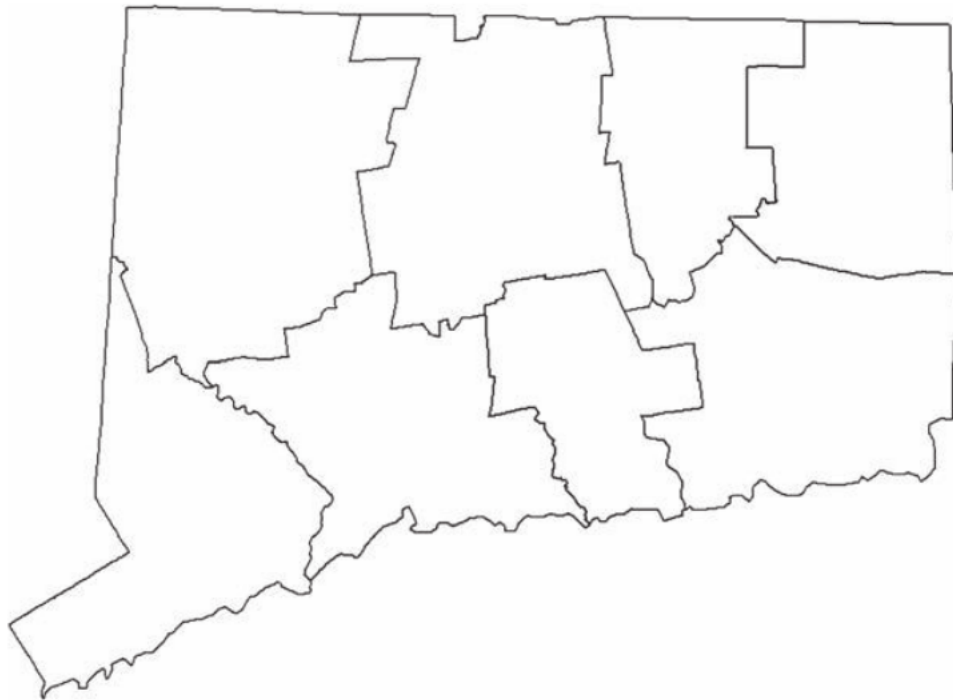


Due date : July 14, 2016

- 1) Suppose you have models of the Platonic solid that are not transparent. Below are sketches of three such solids drawn from different viewpoints. Identify each one and explain the perspective from which each solid was viewed.



- 2) Make models of a tetrahedron, icosahedron, and dodecahedron using paper, glue. Please visit the webpage <http://www.auntannie.com/Geometric/PlatonicSolids/> to be able to print the regular polygons that need to be glued together (they are the faces of the solid).
- 3) Below is a map showing the counties of Connecticut. Create a graph by placing one vertex in each county and then drawing an edge between two counties if they share a common boundary. Color the counties using the minimum possible number of colors.



- 4) A soccer ball is made of pentagons and hexagons. Each pentagon is surrounded by 5 hexagons. Use the Euler characteristic formula to figure out how many

pentagons and how many hexagons are necessary to construct a soccer ball. Below is a picture for easier visualization.



(Hint : Say H many hexagons and P many pentagons are used. Can you relate these two numbers, H, P , using the fact that each pentagon is surrounded by six hexagons and each hexagon is surrounded by three pentagons and three hexagons?)

- 5) Suppose we consider a connected graph in the plane and allow edges to go out from a vertex to infinity. What would $V - E + F$ be for such a graph? Why? (Experiment and discover the pattern.) Hint: Imagine that the infinite edges are splitting up the whole plane. Consider the outside component also as a face where there are no infinite edges.

