1.0011101

Directions: Show all work. No credit for answers without work.

1. [2 points] If a connected planar graph with 83 vertices and 197 edges is drawn in the plane with no edge crossings, how many faces are created? (Include the unbounded, outer face.)

2. [2 points] What is the minimum number of edges that must be removed from K_6 (the complete 6-vertex graph) to obtain a planar graph? Argue that your answer is correct.

3. [2 points] Suppose that a 94-vertex planar graph G can be drawn so that the boundary of every face contains at least 6 edges. Prove that G has at most 138 edges.

4. [2 points] Give a planar drawing of a 10-vertex planar graph in which 6 vertices have degree 4 and the other 4 vertices have degree 3.

5. [2 points] Prove that every 10-vertex planar graph in which 6 vertices have degree 4 and the other 4 vertices have degree 3 contains a triangle.