MATH/CSCI 2113, DISCRETE STRUCTURES II, Winter 2010

Handout 6: Problems on planar graphs
Friday, March 12, 2010

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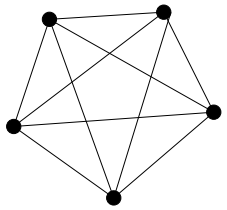
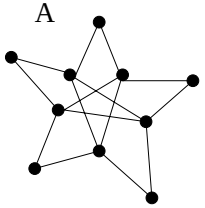
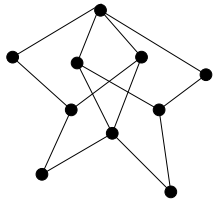
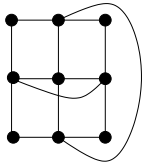
Problem 1. Prove that $K_{3,3}$ cannot be drawn as a planar graph.

$K_{3,3} =$ 

Hint: how many faces would there have to be? What would be the average degree of the faces? Could there be any faces of degree 3 or less?

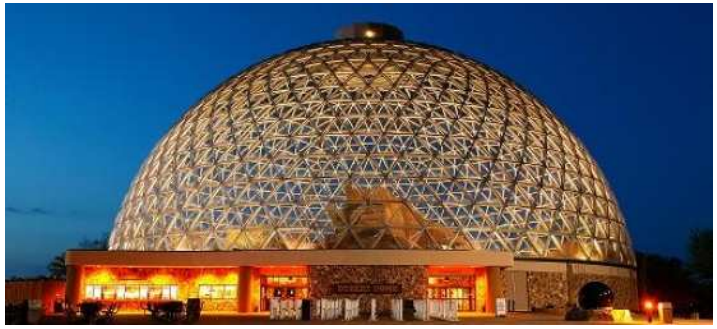
Problem 2.

A  B  C 

(a) Which of the above graphs permit an Euler circuit? (b) Which of the above graphs permit a Hamiltonian cycle? (c) Which of the above graphs can be drawn as a planar graph? (d) Which of the above graphs are bipartite?

Problem 3. I know a planar graph with 14 faces. Each vertex has degree 3. How many vertices are there?

Problem 4.



The Desert Dome at the Omaha Zoo is one of the world's largest geodesic domes. It is built from 1344 triangular windows. The base is a regular 96-sided polygon. One can think of this dome as a planar graph with 1344 triangular faces, plus an outside face of degree 96. How many edges and vertices does this graph have? Approximately what is the average degree of the vertices?

(Source of pictures: Henry Doorly Zoo, Omaha, Nebraska)