HOMEWORK 8
## 415G 001 COMBINATORICS AND GRAPH THEORY

DUE MONDAY 11/23

Exercises

1. The *dual graph* of a (planar embedding of a) planar graph G is a graph G' obtained from the embedding of G by assigning a vertex to each region and an edge between a pair of regions that share an edge. Show that the dual of a planar Eulerian graph is bipartite. (Hint: recall both characterizations of planar graphs and Eulerian graphs.)

2. The *complementary graph* of a simple graph $G = (V, E)$ is a graph $\overline{G} = (V, \binom{V}{2} \setminus E)$ with the same vertex set V such that there is an edge $\{x, y\}$ in $\overline{G}$ if and only if $\{x, y\}$ is not an edge in G. Let $G = (V, E)$ be a simple graph whose vertices are all of degree n and such that $|V| \geq 2n + 2$. Prove that $\overline{G}$ is hamiltonian.

3. Exercise 4.5.

4. Use the planarity algorithm for hamiltonian graphs to determine whether the following hamiltonian graph is planar.
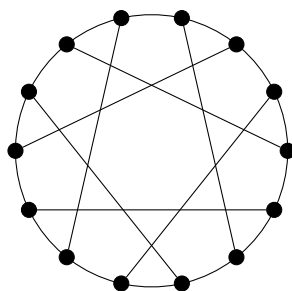
5. Find the best lower bound and upper bound for the TSP solution in the following weighted K_6.
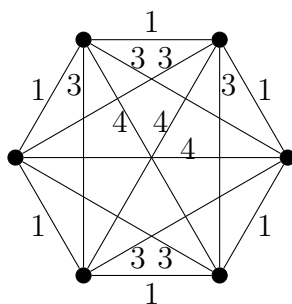
6. Exercise 4.7.

Suggested exercises

From the book. 4.2, 4.3, 4.4, 4.5, 4.6, 4.8, 4.9, 4.12, 4.13.