Math 335 Midterm 2

Name: _____

1. State the definition of

a. a planar graph

b. a Hamiltonian graph

c. an u, v disconnecting set

d. a network

e. a convex subset of $\mathbb{R}^3$

2. Let G be planar and connected with V vertices, E edges and smallest cycle length C. Further suppose that each edge borders exactly two faces. Show that

$$(C-2)E \leq (V-2)C.$$

3. Suppose G is a planar Hamiltonian graph such that every face is surrounded by the same number of edges and such that each edge borders exactly two faces. Show that there must be an even number of faces.

4. Let G be a bipartite Hamiltonian graph with independent sets X and Y. Show that X and Y have the same number of vertices.

5. Use Menger's theorem to explain why $\varepsilon(G)$ and $\varepsilon(G-e)$ can differ by at most 1.