Chapter 10.3-10.4: Paths and Isomorphisms
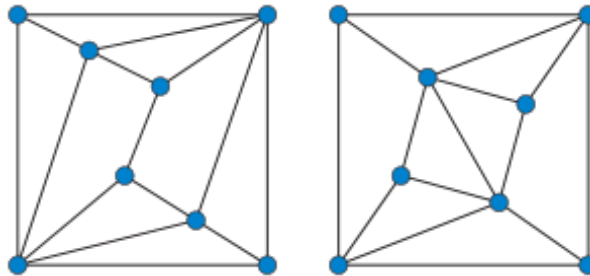Monday, November 30

Definitions

- $\kappa(G)$: Vertex connectivity of G.

- $\lambda(G)$: Edge connectivity of G.

Isomorphisms

1. Show that C_5 and $\overline{C_5}$ are isomorphic.

2. Show that C_4 and $\overline{C_4}$ are not isomorphic.

3. Find a graph G on 4 vertices such that G and $\overline{G}$ are isomorphic.

4. Find all isomers (non-isomorphic graphs) of pentane (C_5H_{12}).

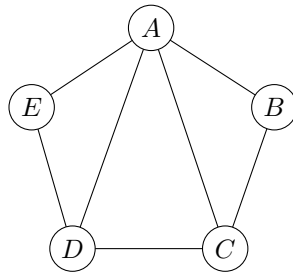5. Show that the following two graphs are not isomorphic:

Connectedness

1. Find a graph G such that $\kappa(G) < \lambda(G)$.

2. Find a graph $G = (V, E)$ such that $\lambda(G) < \min_{v \in V} deg(v)$.

Adjacency Matrices

Here is a picture of a graph:

1. Draw the adjacency matrix A of the graph.

2. Find A^2. What do the diagonal elements of the matrix tell you?

3. How can you use A^3 to count the triangles in a graph?

Proofs

1. Show that if G and $\overline{G}$ are isomorphic then $n \equiv 0 \pmod 4$ or $n \equiv 1 \pmod 4$.

2. Prove: if v has odd degree in G then there is some vertex w such that v and w are connected by a path.