Written Assignment # 14
Math 38
Due: Friday, May 6, 2005

Read Section 4.1

1. What is the difference between "k-connected" and "connectivity k"?

2. What is a Harary graph, $H_{k,n}$? Draw the $H_{4,7}$ and $H_{3,9}$.

3. What is $\kappa(H_{k,n})$?

4. Define a "disconnecting set" of edges and an "vertex cut". Give an example of your favorite Harary graph and illustrate these two definitions by finding a disconnecting set and a vertex cut.

5. Why is $\kappa'(G) \leq \delta(G)$?

6. Is it possible for $\kappa'(G) < \delta(G)$? Give an example.

7. State Theorem 4.1.11 and outline a proof for this theorem making sure you state the main ideas in this proof.

8. What can you say about the edge connectivity and the connectivity of a 3-regular graph? What does this say about the Petersen graph?

9. Give an example of a minimum vertex cut (separating set) in the Petersen Graph. Find a vertex cut U in the Petersen graph such that U is not minimum, but there is no proper subset of U that is a vertex cut of the Petersen graph.

10. Is it true that $\kappa(G - v) = \kappa(G)$ or $\kappa(G - v) = \kappa(G) - 1$? Explain.

11. Can we have a 3-edge-connected graph that is not 2-edge-connected?

12. Give an example of a graph satisfying the following conditions or explain why it is not possible for the graph to exist.

    (a) $\kappa(G) = 2$, $\kappa'(G) = 3$, and $\delta(G) = 4$.
    (b) $\kappa(G) = 3$, $\kappa'(G) = 2$, and $\delta(G) = 4$.