

# WRITTEN ASSIGNMENT # 15

MATH 38

DUE: MONDAY, MAY 9, 2005

## Read Section 4.2

1. Show that for any edge  $e$  in a  $k$ -connected graph  $G$ , then  $G - e$  is  $(k - 1)$ -connected.
2. Define internally disjoint  $u, v$ -paths and find a maximum set of internally disjoint paths in the graph in Exercise 4.2.1.
3. Define an  $x, y$ -cut and find a minimum  $u, v$ -cut in the graph in Exercise 4.2.1.
4. State Whitney's Theorem 4.2.2 and explain how it is proved. What is the hardest step in the proof?
5. What are equivalent ways to say that a graph is 2-connected?
6. State Menger's Theorem and use the graph in Exercise 4.2.1 to illustrate what this theorem says.
7. Define a line graph and compute the line graphs of the graphs in Exercise 4.2.27.
8. What is a block of a graph? How many blocks are there in a 2-connected graph  $G$ ?
9. Give a characterization of  $k$ -connected graphs in terms of internally disjoint  $u, v$ -paths in  $G$ .
10. State Menger's edge version of the min-max theorem.
11. What does  $\kappa(x, y)$ ,  $\kappa'(x, y)$ ,  $\lambda(x, y)$  and  $\lambda'(x, y)$  mean? Compute all these values for the graph in Exercise 4.2.1.