Introduction to Networking

Homework 2

Handed out: Wednesday, January 29, 2003
Due back: Wednesday, February 12, 2003 (at the start of class)
Notes: To be done individually
If you don't have the textbook, please see us for a copy of the problems

1. Textbook problem 3-3
2. Textbook problem 3-6
3. Textbook problem 3-9
4. Textbook problem 3-13
5. Textbook problem 3-16
6. Textbook problem 3-17
7. Textbook problem 3-19
8. Textbook problem 3-21
9. Textbook problem 3-26
10. Textbook problem 3-34

Extra Credit Problems

The book's discussion of congestion control focuses on TCP Reno's approach, which was pioneered by Van Jacobson in the late 1980s. An alternative approach is a part of TCP Vegas, a newer TCP proposal from the mid 1990s. Read about congestion control in Vegas and then write a short (~1 page essay) describing it, comparing to Reno. Will Vegas and Reno connections fairly share network bandwidth?

Several groups outside and inside the networking community claim that TCP (by which they usually mean TCP Reno) is incapable of providing high efficiency on very high performance networks, particularly when the bandwidth delay product is very large. The claim is that this is due to congestion control. Derive an expression for the efficiency (average bandwidth achieved over average bandwidth available) of an infinitely long network connection over a network path with constant latency L and constant bandwidth B that is lossless, error-free, and does not reorder packets.

There are many proposed ways to tweak TCP Reno's congestion control to get more performance. Since it is implemented entirely at the endpoints of the network, this is very easy to do. Suppose we were to make congestion control less aggressive, by increasing the rate of slow start, or decreasing the drop in the congestion window on packet loss, or both. Would we get better performance? Would we continue to be fair to other TCPs? What if every TCP implementation did this?

Write a short essay (~1 page) in answer to the discussion questions on streaming audio that appear at the end of chapter three (page 290, questions 1-2).