Quiz #2 NAME: _____
CS 360 Special Topics: Computer Networking
Spring 2007
25 Points. You have 25 minutes!

GOOD LUCK!

1. (5 points) With respect to TCP, what is the 3-way handshake and why does it need to be 3 messages long? (Discuss what happens if each of the messages are lost.)

After our discussion in class today everyone did well on this question. The book has a good explanation as does TCP/IP Illustrated, Volume 1: The Protocols which can be found via Safari Online (Chapter 18). The one bit that people did not correctly specify is that if a message is lost the sender of that message will timeout waiting for the response and resend the message some number of times before giving up on the connection. Your book does not cover this aspect in detail but TCP/IP Illustrated does.

2. (5 points) The RFC that defines TCP states: "TCP must recover from data that is damaged, lost, duplicated, or delivered out of order…" Describe briefly how TCP handles two of those four errors.

Damage: checksum fails and the ACK is not sent, forcing a retransmit.
Lost: No ACK so a retransmit is forced.
Out of Order: Either dropped or stored. The most recent ACK packet is resent.
Duplicated: the duplicate packet is dropped.

3. (5 points) What is the round trip time for a TCP connection and why does TCP estimate it? (What does it use RTT for and why is it necessary?)

The RTT is the total time it takes for a packet to go from sender to receiver and for the ACK to get back to the sender.

TCP uses RTT to determine how long to wait until a packet that is not ACKed is considered to be lost. RTT is used so that as changing congestion in the network causes the RTT to rise or fall, the amount of time before packets are retransmitted also changes. If the timeout was a fixed amount of time, as congestion slowed the network (but did not stop packets from getting to the destination) unnecessary retransmits may occur.

4. (5 points) In the context of the 7 layer model, why is the network layer of the Internet an unreliable, connectionless network?

The network layer (IP) is unreliable and connectionless so that the layers built on top of the network layer (the transport layer and above) can have a choice to be reliable and connection based (and to pay the performance penalties this incurs) or to be unreliable and connectionless.

In short, if the network layer was reliable all higher level protocols would be reliable. This would cause problems for streaming media protocols, for example, where waiting for retransmitted data is not only pointless but harmful.

5. (5 points) Why is most of the congestion control handled in the Transport layer on the Internet? What is the only solution to congestion?

The only solution for congestion in the network is to send fewer packets. The transport layer is the layer that is responsible for actually managing when packets are sent to the network so this is the correct layer in which to cause fewer packets to be sent.