Student ID: _____

CS457: Computer Networking
Date: 3/20/2007
Name: _____

Instructions:

1. Be sure that you have 8 questions
2. Be sure your answers are legible.
3. Write your Student ID at the top of every page
4. This is a closed book exam
5. Answer each question clearly and to the point. Show all work and assumptions, but do not define or describe concepts unless asked to do so; assume that the graders are familiar with the concepts.

Question	***Points***	***Score***
1	10	
2	10	
3	15	
4	10	
5	10	
6	15	
7	10	
8	20	
total	**100**	

Student ID: _____

1. Answer the following True/False questions by circling either **T** or **F.**

    1. The Internet Protocol provides no delivery guarantees T F

    2. Persistent and non-persistent connections are equivalent for getting only a single object
       T F

    3. P2P networks hide your identity from the authorities T F

    4. Cookies allow one to maintain state across HTTP sessions T F

    5. FTP is said to use “out of band” communication because it does not conform to TCP standards
       T F

    6. Email messages will go through at least 2 SMTP servers T F

    7. The Kazaa network is like a hybrid of the Napster and Gnutella networks T F

    8. A minimal transport layer does nothing more than multiplexing/de-multiplexing T F

    9. GBN uses cumulative acknowledgments T F

    10. RIP runs over TCP T F

Student ID: _____

2. IP Addresses

a. Describe how CIDR introduces a trade-off between the size of our routing tables and the number of wasted addresses in our address space?

b. Describe two technologies that address the problems caused by the number of devices on the Internet approaching or exceeding our 32-bit address space? What problems do these cause?

c. Will these technologies become obsolete with Ipv6, which uses a 64-bit address space?

d. Besides increasing the size of the address space, describe 3 things that Ipv6 introduces that should make routing simpler and faster.

Student ID: _____

3. Persistent and Non-persistent connections

Assume that you want to to retrieve a web page that has 6 images and 1 Java applet. The Java applet retrieves 3 more images before it can run.

a. How many messages must be sent when using non-persistent HTTP before this web page can be viewed ? How many RTTs?

b. How many messages must be sent when using persistent HTTP with no pipelining? How many RTTs?

c. How many messages must be sent when using persistent HTTP with pipelining? How many RTTs?

d. Would you expect persistent connections and pipelining to give you a bigger benefit over non-persistent connections in a high bit-rate network or a low bit-rate network? Why?

e. Would you expect persistent connections and pipelining to give you a bigger benefit over non-persistent connections in a high latency network or a low latency network? Why?

Student ID: _____

4. DNS

a. Describe all of the DNS messages that must be sent in order to retrieve a URL such as http://www.google.com. Assume no cache hits and assume iterative queries.

b. Now assume recursive queries.

c. Using iterative queries again, now assume your local default name server has the entry for the appropriate TLD server cached.

Student ID: _____

5. Reliable Transport

If you had a completely reliable communication layer, your reliable transport layer would not need to do much: it would simply send each packet and, upon reception, deliver it to the application layer.

a. What reliability mechanisms would you need to add if your channel introduced bit errors?

b. What reliability mechanisms would you need to add if your channel also lost packets?

Student ID: _____

6. TCP Acknowledgements

Assume a TCP host is expecting sequence number 2847. Describe what the TCP host does in each of the following scenarios:

a. The last packet received was already acknowledged. A new packet arrives with sequence number 2847 and 253 bytes of data in the message payload.

b. The last packet received not yet been acknowledged. A new packet arrives with sequence number 2847 and 253 bytes of data in the message payload.

c. The last packet received was just acknowledged. A new packet arrives with sequence number 3100 and 177 bytes of data in the message payload.

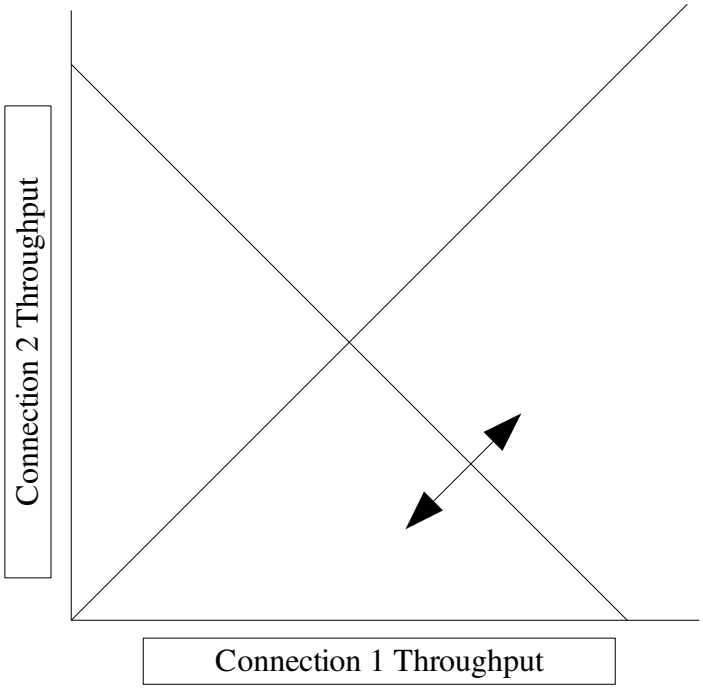
d. The last packet received had sequence number 3100 and 177 bytes of data in the message payload. A new packet arrives with sequence number 2847 and 253 bytes of data in the message payload.

Student ID: _____

7. TCP Fairness

a. We showed in class that TCP congestion control also provides fair utilization to two competing session. What does this mean about whether or not you can hog all of the bandwidth at a WiFi hotspot?

b. If TCP decreased the congestion window linearly instead of multiplicatively, would it still converge to fair utilization of a link when shared between two TCP connections? Argue why or why not, using the graph below.

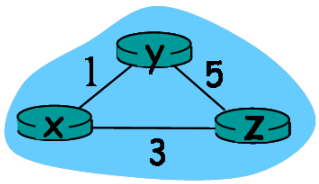


Student ID: _____

8. Distance Vector routing

a. Fill in the route calculations below for the Distance Vector algorithm, using the topology on the right. Then, use the results to fill in the routing table for node *x*.

	Time=1	Time=2	Time=3
node x table	cost to / from: x y z	cost to / from: x y z	cost to / from: x y z
node y table	cost to / from: x y z	cost to / from: x y z	cost to / from: x y z
node z table	cost to / from: x y z	cost to / from: x y z	cost to / from: x y z



destination	link
x	
y	
z	

b. Name 2 differences between generic Distance Vector routing and the RIP algorithm.

Honor Code

_____

_____

_____

Signature _____