Mid-Term Exam

Closed book and notes; In class *Thursday, March 30*

⊕ *Do not forget to write your name on the first page. Initial each subsequent page.*

⊕ *Be neat and precise. I will not grade answers I cannot read.*

⊕ *You should draw simple figures if you think it will make your answers clearer.*

⊕ *When constructing examples, try to construct the simplest example that gets your point across.*

⊕ *Make sure you answer all sub-parts of each question for complete credit.*

⊕ *Good luck and remember, brevity is the soul of wit.*

• Maximum possible points: 50.

Name: _____

Problem	Points
1	
2	
3	
4	
5	
Total	

1. Routing

   (a) Give one advantage and disadvantage each of distance-vector and link-state routing protocols. (2 points)

   (b) If there are no changes to link costs, then distance-vector routing protocols converge. Why? (3 points)

   (c) Give two reasons why a single instance of a link-state or distance vector routing algorithm is not run over the entire Internet. (2 points)

   (d) What is an autonomous system? How are they used in the Internet? (3 points)

2. Congestion avoidance and control.

   (a) Congestion is a problem in the Internet, but link speeds are getting faster all the time and memory is getting ever cheaper. Will faster links and infinite buffers completely solve the congestion problem? (4 points)

   (b) Describe the concept of "self-clocking". How and where is self-clocking used in the Internet protocols? (4 points)

   (c) State one problem with self-clocking. (2 points)

3. IP and TCP protocol details

   (a) IP addresses are assigned to what entities? Be precise. (2 points)

   (b) Suppose host A's IP address is 130.207.8.3 and its subnet mask is 255.255.255.0. Classify the following addresses as belonging to the (a) the same machine, (b) the same subnet, (c) different subnet on same class B net, or (d) different class B net. You can just write (a), (b), (c), or (d) beside each address. (2 points)
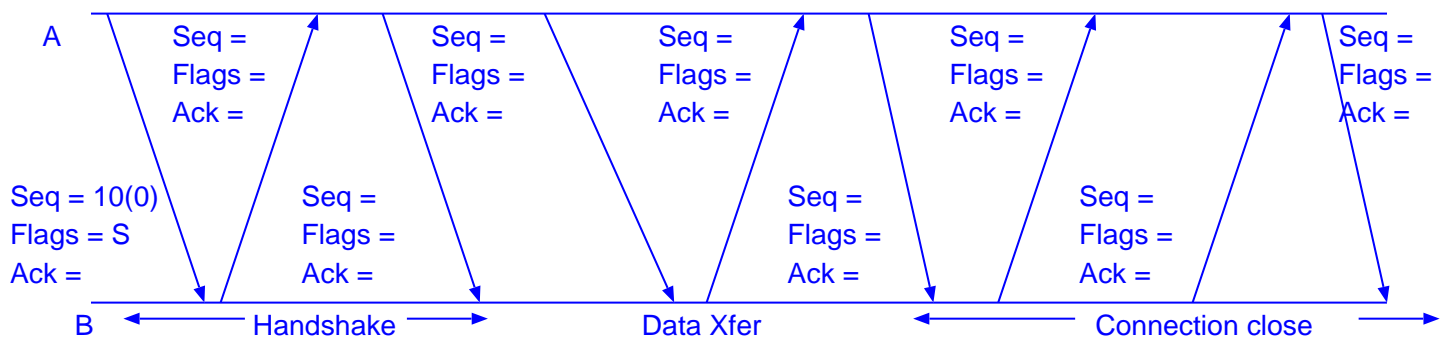
       130.207.8.1   130.207.9.12   128.8.128.147

   (c) What is CIDR (Classless Inter Domain Routing)? State one difference between subnet masking and CIDR. (3 points)

   (d) Complete the following time-diagram for a TCP transfer. Host A initiates a TCP connection to host B. The ISN from A to B is 10, and the ISN from B to A is 20. Host A wants to transmit 1 byte of data to host B after the three-way handshake is complete and then close the connection. There is no data loss.

(Seq = x(y) means segment has seq. number x and contains y bytes of data.)

A

Seq =
Flags =
Ack =

Seq =
Flags =
Ack =

Seq =
Flags =
Ack =

Seq =
Flags =
Ack =

Seq =
Flags =
Ack =

Seq = 10(0)
Flags = S
Ack =

Seq =
Flags =
Ack =

Seq =
Flags =
Ack =

Seq =
Flags =
Ack =

B   ← Handshake →   Data Xfer   ← Connection close →

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4. Domain Name System

(a) What is the basic function of DNS? Give two reasons why a de-centralized name service implementation is better than a centralized implementation. (3 points)

(b) What is a DNS resource record? What is the structure of a DNS RR? (3 points)

(c) Note that there is no machine with DNS name `umd.edu`. However, electronic mail can be sent to addresses of the form `user@umd.edu`. Explain how this is resolved? (4 points)

5. Multicast

    (a) What is the difference between multicast and broadcast? (1 point)

    (b) Explain the terms pruning and grafting. (4 points)

    (c) Describe using an example how reverse path forwarding (or reverse path broadcast) works? (5 points)