CSC 344: Computer Networks Review Questions

1. **Select the correct answer among the choices by placing a checkmark next to the right statement**.

(i).

- ARP (Address Resolution Protocol) is used to obtain IP address for a MAC address
- ARP (Address Resolution Protocol) is used to obtain MAC address for an IP address

(ii).

- IP datagram packet is payload of a TCP segment
- TCP segment is payload of an IP datagram

(iii).

- In the TCP 'flow control' is done to ensure that there is no packet loss.
- In the TCP 'flow control' is done to ensure the receiver buffer does not over flow.

(iv).

If a TCP server were to support **100** simultaneous connections, each from a different client, how many sockets would the TCP server have?

- 100 sockets
- 200 sockets
- 101 sockets

(v). DNS (domain name service) uses

- TCP protocol for the transport layer to enquire the IP address from a server
- UDP protocol for the transport layer to enquire the IP address from a server

(vi). The length of MAC address (in number of bits) is?

- Varies from 32 bits to 64 bits
- 8 bits
- 16 bits
- 32 bits
- 48 bits
- 64 bits

(vii). Which of the following statement is true.

- All hosts on the same subnet are configured with the same subnet mask.
- Each host has its own distinct mask

(viii). The maximum length of an Ethernet frame (in number of bytes) is?

- 100 bytes
- 1000 bytes
- 1500 bytes

(ix). In the Network Layer Protocol **IPv4,** the IP datagram has a TTL (time –to-live) field.

The value of this field is?

- the length of time after which the datagram is destroyed.
- The length of time record is maintained in the DNS server
- The number of hops after which the datagram is destroyed

(x). In DHCP**,** the field TTL (time –to-live) field is?

- The length of time for which the IP address is valid.
- The length of time record is maintained in the DNS server
- The number of hops after which the datagram is destroyed

(x). In DNS**,** the field TTL (time –to-live) field is?

- The length of time for which the IP address is valid.
- The length of time record is maintained in the DNS server
- The number of hops after which the datagram is destroyed

(xii). If an IP address is 123.1.1.0/24 then how many hosts can there be within the subnet?

- 32
- 64
- 128
- 256
- 512

(xiii). NAT enabled routers are used for.

- Ethernet connection within a small Network
- Masquerading multiple devices behind a single IP address
- Routing IP datagrams in internet

(xiv). In a Ethernet, the hosts which are connected by a switch,

- Share the 'collision domain'
- Do not share the 'collision domain

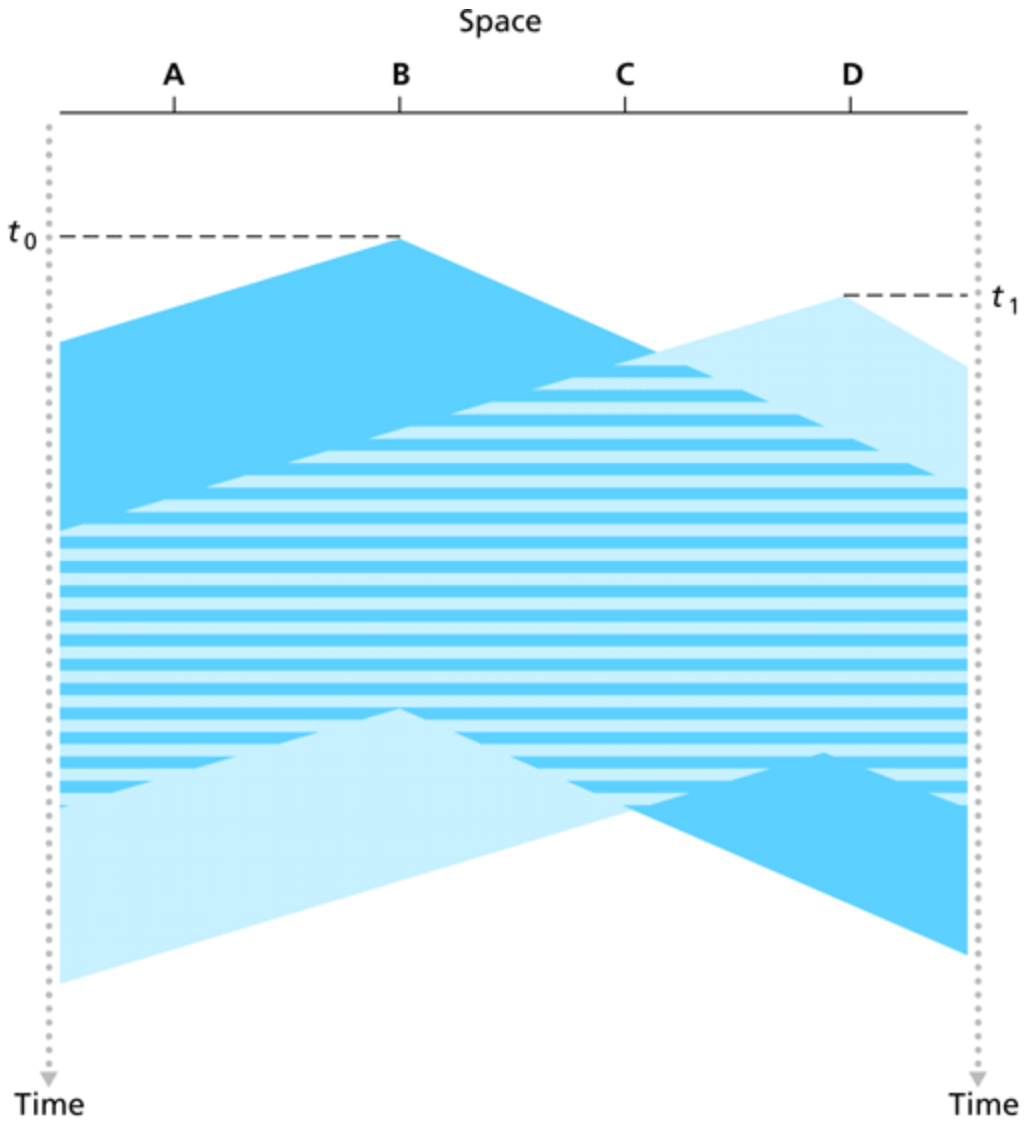
(xv). In case of TCP protocol, error in a TCP segment is detected by the sender which of the following

- The sender receives a duplicate positive acknowledgement
- The sender receives a negative acknowledgement
- The sender does not receive any acknowledgement within the time out interval

2. In the CSMA/CD: Ethernet multiple access protocol whenever there is a collision the adapter waits for **K.512** *bit times* after a collision. For K = 20 how long does an adapter wait until returning to sense the channel for retransmission in a 10Mbps Ethernet?

3. Consider an IP subnet with prefix 129.17.129.97/25. Provide the range of IP addresses (of the form xxx.xxx.xxx.xxx to yyy.yyy.yyy.yyy) that can be assigned to hosts in the subnet.

4. Four hosts A, B, C, and D are connected by an Ethernet. In the following space-time diagram, **identify the times (place an x mark and identify the time on time axis** similar to t0 and t1) when the nodes A, B, C and D detect collision.



Space-time diagram of two CSMA nodes with colliding transmissions

5. Host A and B are directly connected with a 100 Mbps link. There is one TCP connection between two hosts, and A is sending to B an enormous file over this connection. Host A can send into its TCP connection at a rate of 80 Mbps, but host B can read out of it's receive buffer at a maximum rate of 40 Mbps. Which of the two mechanisms in TCP will go into effect**? (place a checkmark)**

- Flow Control
- Congestion Control

6. To control Congestion in TCP two variables **cwnd**, **rwnd** and are used by sender. The variable **cwnd** refers to the size of congestion window, and **rwnd** is the size of receiver window, then which of the following inequality is true.

    - LastByteSent – LastByteAcked <= min{cwnd, rwnd}
    - LastByteSent – LastByteAcked <= max{cwnd, rwnd}
    - LastByteSent – LastByteReceived <= min{cwnd, rwnd}
    - LastByteSent – LastByteReceived <= max{cwnd, rwnd}

7. Consider a 1 **Gbps** Ethernet . To have an efficiency of 80% what is the maximum distance between two nodes? Efficiency of Ethernet is given by the following Formula:

$$Efficiency = \frac{1}{1 + {5d_{prop}}/{d_{trans}}}$$

    Assume a frame length of 1500 **bytes** and that there are no repeaters. Also assume the propagation speed of 2×10^8 **m/sec**

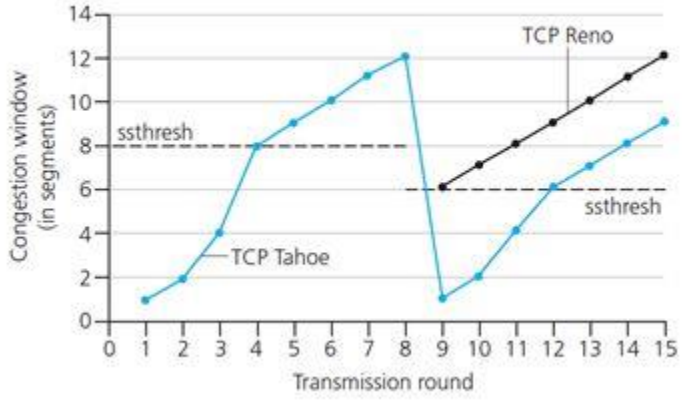
8. Suppose users share a 1 Mbps link. Also suppose each user requires 500 kbps *when transmitting*, but each user transmits only 10 percent of the time. (See the discussion on Packet switching Versus Circuit Switching in textbook page 30).
    - When circuit switching is used how many users can be supported.
    - For the remainder of the question assume packet switching is used.
        - Why will there be no queueing delay if two or fewer users transmit simultaneously?
    - What is the probability that a user is transmitting?
    - Suppose there are three users what is the *probability that at any given time all three users are transmitting*.
    - Suppose that there *are five users*, what is the *probability that three of them are transmitting*. (use property of binomial probability)
    - Suppose that there *are five users*, what is the *probability that less than three of them are transmitting*. (use property of binomial probability)

- Suppose that there *are five users*, what is the *probability that more than three of them are transmitting*. (use property of binomial probability)

9. Suppose within your Web browser you click on a link to obtain a Web page. Suppose that the IP address of the URL is cached in your local host, so that DNS look up is not necessary. Denote RTT as the round trip time between the local host and the server containing the Web page. Assume the Web page consists of a base html file and three small images. Assume the transmission time for all the objects is negligible in comparison with the RTT. How much time elapses (in terms of RTTs) from the time user clicks on the link until the client receives the entire Web page for each of the following?

- Non-persistent HTTP with no parallel connection.
- Non-persistent HTTP with up to five parallel connection.
- Persistent HTTP with pipelining.

10. Figure 3.53 is copied below,



For each of the TCP Tahoe and TCP Reno protocols experiencing the behavior shown, answer the following questions. Give one line justifying your answer.

a. Identify the intervals of time when TCP **slow start** is operating.
b. Identify the intervals of time when TCP **congestion avoidance** is operating.
c. Identify the Transmission round when **triple duplicate ACK event** occurs.
d. What is the initial value of ssthresh at the first transmission round?
e. What is the initial value of ssthresh at the 10th transmission round?