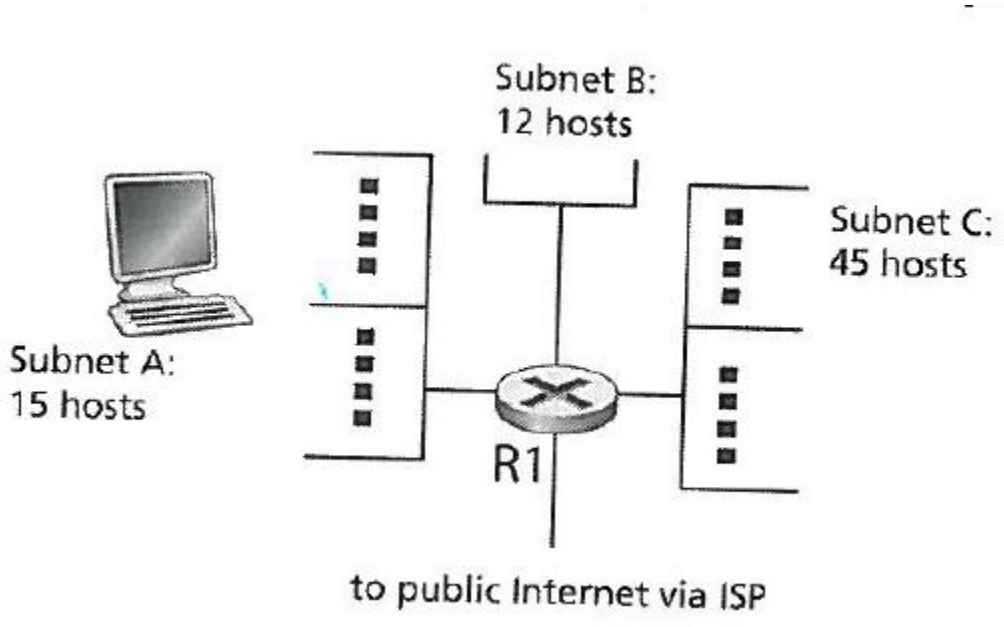
Review Questions for Midterm Exam-2 Fall 2016

1. **(Reference Page 340 of textbook)** Which of the following statement is true?
    a. All hosts on the same subnet are configured with the same subnet mask.
    b. Each host has its own distinct mask
2. **(Reference page 345-348 of textbook**) Which of the following is true for a **DHCP discover message** sent to the DHCP server? The source IP is set to:
    a. **0.0.0.0**
    b. **255.255.255.255**
3. **(Reference Page 349 of textbook)** NAT enabled routers are used for
    a. Ethernet connection within a small Network
    b. Masquerading multiple devices behind a single IP address
    c. Routing IP datagrams in internet
4. **(Reference Page 269-270 of textbook)** 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}

5. Consider an **IP subnet with prefix 129.17.129.97/27**. 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.

6. (**Reference page 338—of textbook**) Assign network addresses for the subnets A, B, C in the following diagram so that only a single aggregate address needs to be advertised byR1 to the public Internet.



7. **(Checksum in TCP/UDP, Reference page 202 of textbook)** UDP and TCP use 1's complement for their checksum. Suppose you have the following three 8-bit bytes: 01010011, 01100110, 01110100. What is the 1s complement of the sum of these three 8-bit bytes? (Note that although UDP and TCP use 16-bit words in computing the checksum, for this problem you are being asked to consider 8-bit sums.).

8. **(Sec. 3.5.3 Page238- RTT estimation in TCP)** Let α = 0.2. Suppose for a given TCP connection three acknowledgements have been returned with RTTs:
    a. RTT for first ACK = 40 msec;
    b. RTT for second ACK = 30 msec; and
    c. RTT for third ACK = 50 msec.

    Determine the value of **Estimated RTT** after each of the three acknowledgements.

Helpful formulae are given below

$$\boldsymbol{EstimatesRTT} = (\mathbf{1}-\propto).\boldsymbol{Estimated\ RTT}+\propto.\boldsymbol{SampleRTT}$$
$$\boldsymbol{DevRTT} = (\mathbf{1}-\boldsymbol{\beta}).\boldsymbol{DevRTT}+\boldsymbol{\beta}.|\boldsymbol{SampleRTT}-\boldsymbol{EstimatedRTT}|$$
$$\boldsymbol{TimeoutInterval} = \boldsymbol{EstimatedRTT}+\mathbf{4}.\boldsymbol{DevRTT}$$

9. **Flow control in TCP- Problem P28 page 294 of textbook** Host A and B are directly connected with a 100 Mbps link. There is one TCP connection between the two hosts, and Host A is sending an enormous file to Host B over this connection. Host A can send application data into the link at 50 Mbps but Host B can read out of its TCP receive buffer at a maximum rate of 10 Mbps. The **TCP receive buffer is of size 100 MB** (note the size is in bytes).

    Considering how TCP flow control regulates the data sent by A and no loss or transmission delay**.**

    a. Assuming that the receive buffer is empty, what is the size of RcvWindow?

    b. How long does it take before the RcvWindow = 50 MB (is half full)?

    c. How long does it take before the RcvWindow == 0 (is full)?

10. TCP congestion control (Reference Page 277 of textbook)

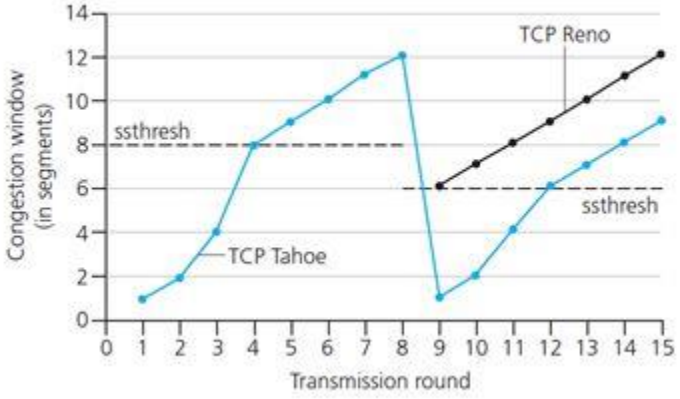
Consider sending a large file from one host to another over a TCP connection that has no loss.

a. Suppose TCP uses AIMD (additive increase multiplicative decrease for its congestion control without slow start. Assuming CongWin increases by 1 MSS every time an ACK is received and assuming approximately constant round-trip times, how long does it take for CongWin to increase from 1 MSS to 5 MSS (assuming no loss events and constant RTT)?

b. What is the average throughput (in terms of MSS and RTT) for this onnection up through time = 4 RTT?

11. (**Reference Page 272 –of textbook**) 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?



12. (**Reference Sec4.5.1 page 366—of textbook**) Complete the routing table for the network in the following figure using Link State algorithm. (See for example homework problem on routing).