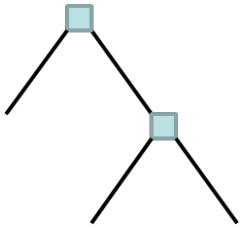
Cpr E 489 Spring 2020
Homework #4
Due Date: 03/31/2020 (Tue) by 11:00 AM
Type your answers and submit on Canvas

1. (40 points)

   a. (20 points) In Slotted ALOHA, time is divided into slots, and each time slot is $\mathbf{x}$ seconds long, where $\mathbf{x}$ is the frame transmission time; stations are allowed to transmit only at the beginning of a time slot. Consider a special version of Slotted ALOHA where each time slot is instead $\mathbf{0.7x}$ seconds long; the frame transmission time is still $\mathbf{x}$ seconds and stations are allowed to transmit only at the beginning of a time slot. What is the length of the vulnerable period for this special version of Slotted ALOHA? Justify your answer.

   b. (20 points) Suppose a CSMA/CD based LAN transmits at 135 Mbps. It has a tree topology as shown in the figure, with 4 segments connected by 2 repeaters. The maximum length of each segment is 100 meters; and the processing delay at each repeater is 1.5 μs. Signal propagates at $2*10^8$ m/s. What is the minimum frame size required for this CSMA/CD based LAN to operate properly? Justify your answer.



2. (30 points) Suppose a router has the following routing table:

Destination	*Next-Hop Router*
205.36.0.0/16	205.36.0.1
205.36.128.0/18	205.36.128.1
205.36.136.0/21	205.36.136.1
0.0.0.0/0	205.36.1.1

   Describe how the router looks up this routing table and makes the routing decision on where to forward a packet with the following destination IP address: (a) 205.63.130.1; (b) 205.36.140.2; (c) 205.36.150.3.

3. (30 points) An organization is assigned a Class-C network 200.120.80.0 and wants to form subnets for its three departments: D1 (60 hosts), D2 (90 hosts), and D3 (90 hosts). Describe a possible arrangement of subnets (i.e., give the network address and the subnet mask of each subnet) to make this possible. Note that a department may be assigned multiple subnets; subnets may have different sizes and they shall not overlap.