Homework 2 CS 352 Due 5PM Nov 10, 2021

15 Questions (0.5 point for first 10 questions, 2 points for last 5 questions)

1. List Three Classes (i.e., A, B, C) of IP Addresses' two-level hierarchy, i.e., how many bits for Net ID, and how many bits for host ID.

2. List the key problem of Class A, B and C IP addresses, separately.

3. Please finish the following figure for a Traceroute operation, showing each TTL for each packet
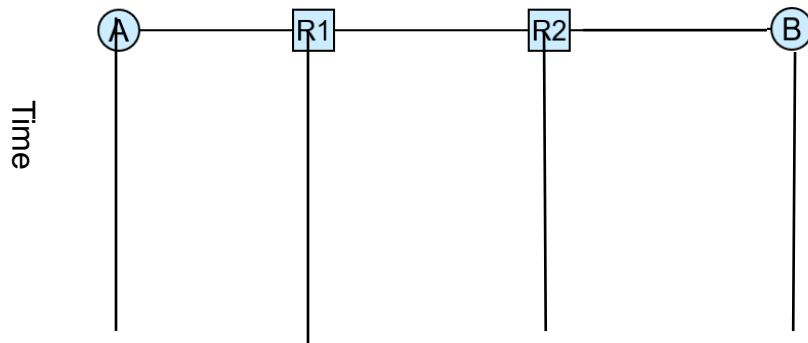
4. Please finish the following figure for a PING operation, showing Echo Request and Echo Replay
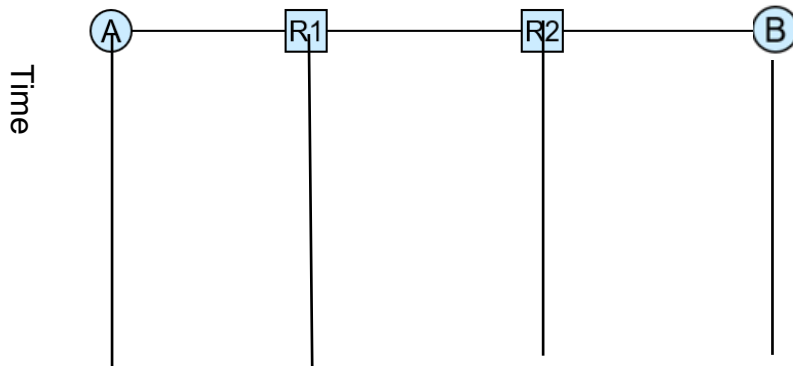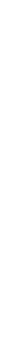

5. Please finish the following figure for DHCP Dynamic IP address allocation with

6. Explain why Hierarchical Routing needs both intra-AS and inter-AS routing protocols.

7. What are key functions of BGP in terms of working with AS?

8. Provide two kinds of classification for routing algorithms.

9. What is the basic idea for the Distance Vector Routing Algorithm?

10. What is the basic idea for the Link-State Routing Algorithm?

11: Consider sending a 2400-byte datagram into a link that has an MTU of 700 bytes. Suppose the original datagram is stamped with the identification number 422. How many fragments are generated? What are the values in the various fields in the IP datagram(s) generated related to fragmentation?

12:

(a) Consider a router that interconnects three subnets: Subnet 1, Subnet 2, and Subnet 3. Suppose all of the interfaces in each of these three subnets are required to have the prefix 223.1.17/24. Also suppose that Subnet 1 is required to support up to 63 interfaces, Subnet 2 is to support up to 95 interfaces, and Subnet 3 is to support up to 16 interfaces. Provide three network addresses (of the form a.b.c.d/x) that satisfy these constraints.

(b) Consider a subnet with prefix 128.119.40.128/26. Give an example of one IP address (of form xxx.xxx.xxx.xxx) that can be assigned to this network. Suppose an ISP owns the block of addresses of the form 128.119.40.64/26. Suppose it wants to create four subnets from this block, with each block having the same number of IP addresses. What are the prefixes (of form a.b.c.d/x) for the four subnets?

13: *Consider the following network. With the indicated link costs, use the link state algorithm to compute the shortest path from u to all network nodes. Show how the algorithm works by computing a table similar to the table on our lecture slides.*
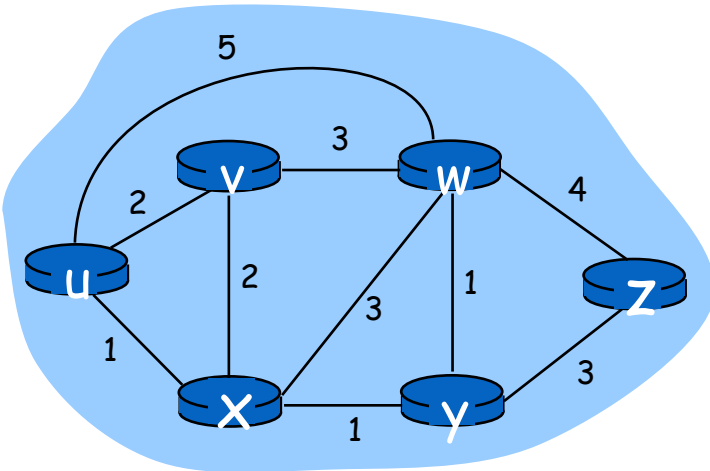
14: Similar to the previous question, for this more complicated network topology, please *use the link state algorithm to compute the shortest path from x to all network nodes. Show how the algorithm works by computing a table similar to the table on our lecture slides.*
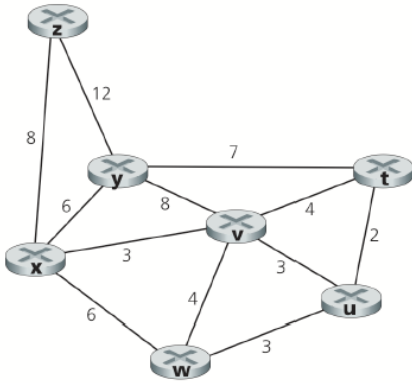
15: Consider a fully connected three-node topology shown on the right slide. Let the link costs be c(x,y) = 3, c(y,z) = 6, c(z,x) = 4. Compute the distance tables after the initialization step and after each iteration of the distance-vector algorithm as done for the example on the lecutre slides.