Dear Students: These are more samples on addressing, subnetting and routing. NO solutions will be posted but will be glad to answer your inquiries or check your work via e-mail (for DEN) or during office hours.

1. A node with address 191.192.193.194/25 sends a packet to 191.192.193.225/25. Is the help of a router required for this delivery?

2. An ATT team needs to provide 50000 customers with Internet service, however it is only given a pool of 256 IP addresses. Suggest an address allocation methodology to make this service possible.

3. A class B network is recognized by its network address, 145.11.0.0. The network address of its first subnet is 145.11.0.0 as well. Explain why identical network addresses for two networks (the main one and one of its subnets) won't create any ambiguity. List the network address of subnet 15 if the class B network in the previous part has been divided
4. Into 32 subnets (subnet 0 to subnet 31). Also specify the address range of subnet 29. Finally, list the direct broadcast address of subnet 31 and the network address of subnet 14.

5. Network 11.0.0.0/8 needs to support 3 customers each of which needs 150 IP addresses. However in the near future each customer expects to needs 450 more addresses. What is a reasonable address allocation?

6. Find the range of addresses in the following blocks.
   a) 123. 56.77.32/29
   b) 200.17.21.128/27
   c) 17.34.16.0/23
   d) 180.34.64.64/30

7. Divide USC network into 512 subnets. Specify the network address, the direct broadcast address and the range of host IP addresses for subnets 0, 250, and 511.

8. Following the CIDR notation, a block of addresses is represented as 128.125.0.0/14. **i**. Is this the USC network? Hint: Find the network address and see whether it's the same as USC's. **ii**. What is the network mask? **iii**. What is the size of the block in terms of the number of addresses, **iv**. What is the size

of the block in terms of the number of hosts? **v**. Host A with IP address 128.125.61.61 wants to send a message to host B with IP address 128.124.60.65. Apply the network mask to see whether they belong to the same network? **vi**. Is it possible hosts A and B belong to different subnets? **vii**. Can the network be represented as 128.125.61.162/14?

9. Divide 128.125.0.0/14 into 2048 subnets. **i**. What is the size of each subnet, i.e., the number of addresses and the number of hosts? What is the network address of subnet 100? **ii**. Combine subnets 0, 1, 2, and 3 into one subnet, but keep the rest as they are. **iii**. What is the subnet mask for combined subnet?

10. The IP address of one of the hosts in a class C network is 199.123.253.16. **i**. What is the CIDR notation of the corresponding network? **ii**. We would like to set up 8 subnets. What is the subnet mask? What are the subnet addresses (i.e., the network address of each subnet?)

11. The IP address of one of the hosts in a subnet is 111.15.75.189. The subnet mask is given as 255.255.192.0. **i**. Represent the subnet following the CIDR notation. **ii**. What is the hostid? **iii**. Is it possible to find out what the original network is? Justify your answer.

12. An ISP is granted a bock of addresses represented by 150.80.0.0/15. The ISP wants to distribute these blocks to 2600 customers as follows:
    a. The first group has 200 small size businesses; each needs 128 addresses.
    b. The second group has 400 very small businesses; each needs 20 addresses.
    c. The third group has 2000 households; each needs 5 addresses.

    Design the sub-blocks and give the slash notation for each sub-block. Find out how many addresses are still available after these allocations.

13. An organization is granted the block of 193.56.0.0/13. The administrator wants to create 1024 subnets.
    a. Find the subnet mask.
    b. Find the number of addresses in each subnet.
    c. Find the 1st and last addresses in the first subnet
    d. Find the 1st and last address in the last subnet.

14. Consider the following network. With the indicated link costs, use Dijkstra's shortest path algorithm to compute the shortest path from 4 to all network nodes. Show how the algorithm works by computing a table similar to the one on lecture slides.