

CSE 4344/5344 Computer Networks

Fall 2024

Homework 1

Due Date: November 3 (11:59PM)

Full Points: 100

Instruction:

- You can use multiple resources but you must answer each questions in your own words. If anything found copied, everyone involved will be penalized -100.
 - Show detail of the work for each problem.
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Q 1: Consider a datagram network using 32-bit host addresses. Suppose a router has four links, numbered 0 through 3, and packets are to be forwarded to the link interfaces as follows:

Destination Address Range	Link Interface
11100000 00000000 00000000 00000000 through 11100000 00111111 11111111 11111111	0
11100000 01000000 00000000 00000000 through 11100000 01000000 11111111 11111111	1
11100000 01000001 00000000 00000000 through 11100001 01111111 11111111 11111111	2
otherwise	3

Describe how your forwarding table determines the appropriate link interface for datagrams with destination addresses: **(10 Points)**

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11001000 10010001 01010001 01010101
11100001 01000000 11000011 00111100
11100001 10000000 00010001 01110111
```

Q 2: 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 at least 60 interfaces, Subnet 2 is to support at least 90 interfaces, and Subnet 3 is to support at least 12 interfaces. Provide three network addresses (of the form a.b.c.d/x) that satisfy these constraints.

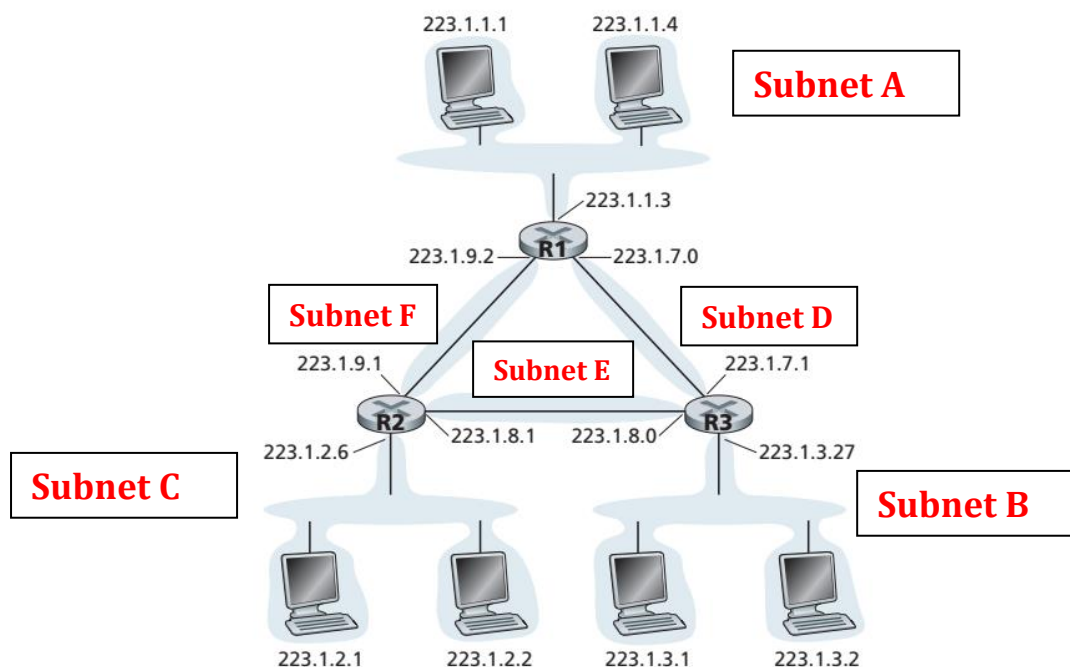
(15 Points)

Q 3: 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?

(15 Points)

Q 4: Consider the topology shown in following figure. The three subnets with hosts are denoted as Networks A, B, and C. And the subnets without hosts are denoted as Networks D, E, and F.

(20 Points)



Assign network addresses to each of these six subnets, with the following constraints:

All addresses must be allocated from 214.97.254/23;

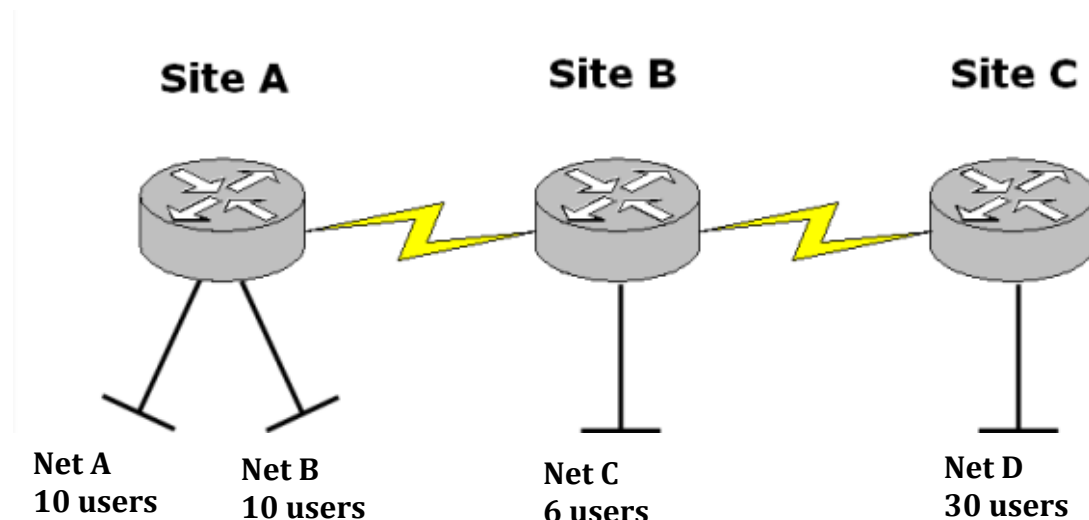
Subnet A should have enough addresses to support 250 interfaces;

Subnet B should have enough addresses to support 120 interfaces;
and

Subnet C should have enough addresses to support 120 interfaces.
Of course, subnets D, E and F should each be able to support two
interfaces. For each subnet, the assignment should take the form
a.b.c.d/x or a.b.c.d/x – e.f.g.h/y.

Q 5: 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? **(15 Points)**

Q.6. Suppose you are creating classless networks (using VLSM) for the network depicted in the following diagram with a class C network 192.168.10.0/24. **(15 Points)**



List subnet for each networks under each site. Do not forget to write for the two WAN links.

Example: Let's say, a network (Net XYZ) requires subnetting with /30, and since the given network ID is of class C, you need to write following for NetXYZ:

Net XYZ requires /30 and the corresponding subnet mask is:
255.255.255.252

Q.7. For the following diagram, find the summarized route that the router R1 will forward to the router R2. Show detail of your work and express the summarized route in CIDR format. **(10 Points)**

