1. A network on the Internet has a subnet mask of 255.255.240.0. What is the maximum number of hosts it can handle?

2. An organization has a class B network and wishes to form subnets for 64 departments. The subnet mask would be _____

3. Convert the IP addresses in to their binary representation and Identify the address class of the following IP addresses: 200.58.20.165; 128.167.23.20; 16.196.128.50; 50.156.10.10; 250.10.24.96.

4. A host in an organization has an IP address 150.32.64.34 and a subnet mask 255.255.240.0. What is the address of this subnet? What is the range of IP addresses that a host can have on this subnet?

5. A large number of consecutive IP addresses are available starting at 198.16.0.0. Suppose that four organizations, A, B, C, and D, request 4000, 2000, 4000, and 8000 addresses, respectively, and in that order. For each organization, find the first IP address assigned, the last IP address assigned, and the mask in the w.x.y.z/s notation.

6. A university has 150 LANs with 100 hosts in each LAN.
   I. Suppose the university has one Class B address. Design an appropriate subnet addressing scheme.
   II. Design an appropriate CIDR addressing scheme.

7. A small organization has a Class C address for seven networks each with 24 hosts. What is an appropriate subnet mask?

8. Perform CIDR aggregation on the following /24 IP addresses: 128.56.24.0/24; 128.56.25.0./24; 128.56.26.0/24; 128.56.27.0/24.

9. An organization requires a range of IP addresses to assign one to each of its 1500 computers. The organization has approached an Internet Service Provider (ISP) for this task. The ISP uses CIDR and serves the requests from the available IP address space 202.61.0.0/17. The ISP wants to assign an address space to the organization which will minimize the number of routing entries in the ISP's router using route aggregation. Find Potential address spaces from which the ISP can allot any one to the organization?

10. In the network 200.20.11.144/27, the fourth octet (in decimal) of the last IP address of the network which can be assigned to a host is _____.

Fragmentation

1. A router with MTU of 1024 bytes has received an IP packet of size 4240 bytes with an IP header of 20 bytes. The value of MF and offset of the 3rd fragment is _____

2. Consider an IP packet with a length of 2000 bytes which includes a 20-byte header . The packet is forwarded to an IPv4 router that supports a Maximum Transmission Unit (MTU) of 400 bytes. Assume that the length of the IP header in all the outgoing fragments of this packet is 20 bytes. The fragmentation offset value stored in the third fragment is _____.

3. The packet is sent from source to router with the link having the maximum transmission unit (MTU) as 480 bytes, the header is of size 20 bytes. The intermediate fragment size is X and the last fragment size is Y when the packet size is of 2000 bytes including the header. Calculate the value of X+Y in bytes?

4. Let an IP datagram of the following data and header sizes be sent through a network of MTU 500 bytes. Calculate the fragment offset values that should be set for 3rd fragment ? IP header = 40 bytes TCP header = 60 bytes" Data = 1000 bytes" MTU = 500 bytes"

5. Consider sending a 1,600-byte datagram into a link that has an MTU of500 bytes. Suppose the original datagram is stamped with the identificationnumber 291.
   a.How many fragments are generated?
   b.What are the values in thevarious fields in the IP datagram(s) generated related to fragmentation?

6. Suppose a router receives an IP packet containing 600 data bytes and has to forward the packet to a network with maximum transmission unit of 200 bytes. Assume that the IP header is 20 bytes long. Show the fragments that the router creates and specify the relevant values in each fragment header (i.e., total length, fragment offset, and more bit).

7. A packet has arrived in which the offset value is 100, the value of HLEN is 5, and the value of the tota1 length field is 100. What are the numbers of the first byte and the last byte?

8. Suppose a router receives an IP packet containing 600 data bytes and has to forward the packet to a network with a maximum transmission unit of 200 bytes. Assume that the IP header is 20 bytes long. What will be the fragment offset of the third fragment ?

6. The following are estimates of the population of major regions of the world: Africa 900 million; South America 500 million; North America 400 million; East Asia 1500 million; South and Central Asia 2200 million; Russia 200 million; Europe 500 million.

a. Suppose each region is to be assigned 100 IP addresses per person. Is this possible? If not, how many addresses can be assigned per person?

b. Design an appropriate CIDR scheme to provide the addressing in part (a).

A token bucket scheme is used for traffic shaping. A new token is put into the bucket every 5 ¼sec. Each token is good for one short packet, which contains 48 bytes of data. What is the maximum sustainable data rate?

How long does it take a packet of length 1,000 bytes to propagate over a link of distance 2,500 km, propagation speed 2.5 · 108 m/s, and transmission rate 2 Mbps? More generally, how long does it take a packet ... s, and transmission rate R bps? Does this delay depend on packet length? Does this delay depend on the transmission rate?