Homework 9 (Network Layer)

Concepts

- CIDR Addressing and Subnetting
- IP Fragmentation

Q1

A router has the following forwarding table, show how a packet with a dest. IP address `180.70.65.140` is forwarded. Which interface?

Prefix	Network id	Next Hop	interface
/26	`180.70.65.192`		m2
/25	`180.70.65.128`		m0
/24	`201.4.22.0`		m3
/22	`201.4.16.0`		m1
default	default	`180.70.65.200`	m2

Q2

Using Q1 router, show how a packet with dest. IP address `201.4.22.35` is forwarded. Which interface?

Q3

Using Q1 router, show how a packet with dest. IP address `201.4.16.70` is forwarded. Which interface?

Q4

If an ISP owns the block of addresses of the form 128.119.40.64/26, and it wants to create 4 subnets from this block, where each block having the same number of hosts. What are the prefixes (of the form a.b.c.d/x) for the 4 subnets in ascending order? How many host id's each can support?

Q5

Consider sending a 2400-byte datagram into a link that has an MTU of 700 bytes. How many fragments are generated? What are the segment offset values in each IP header? What is the length of the first fragment? And the last fragment?

Q6

What is network id of `141.14.72.24` with default mask of `255.255.0.0` ? What is its network id with a subnet mask `255.255.192.0` ? How many subnets are supported?

Q7

What is the maximum number of subnets in each case?

1. class A with a netmask `255.255.192.0`
2. class B with a netmask `255.255.192.0`
3. class C with a netmask `255.255.255.192`
4. class C with a netmask `255.255.255.240`

Q8

In a class A network with a (subnet) netmask `255.255.0.0` , if we know the IP address of one of the hosts `25.34.12.56` , what is the **first** usable IP address of this subnet? How many subnets are supported? How many hosts are in each subnet?

Q9

What is the **first** usable IP address in the block if one of the addresses is `167.199.170.82/27` ? How many usable IP addresses?

Q10

A router has the following prefixes in its forwarding table.

IP Address	Netmask	Interface
0.0.0.0	0.0.0.0	eth0
12.1.0.0	255.255.0.0	eth1
12.1.1.0	255.255.255.0	eth2
12.1.1.200	255.255.255.255	eth3

Fill the **Network ID** and **Interface** for the given IP addresses.

IP Address	Network ID	Interface
1. 12.1.1.200		
2. 12.1.0.20		
3. 128.12.92.53		