DFN5511 – Fundamentals of Networking
Tutorial 1

1. Given an IP address 210.100.56.0 and 6 subnets are needed. Answer the following question:
   i. Identify the class for the IP address.
   ii. What is its default subnet mask?
   iii. What is the custom subnet mask?
   iv. Find the possible number of subnets.
   v. Find the number of hosts per subnets (usable addresses).
   vi. What is the total number of addresses?

2. An organization is given the block 14.24.74.0/24. 3 subblocks of addresses are needed to be given to its 3 offices: 10, 60 and 120 addresses. Answer the following question:
   i. Calculate the total number of addresses.
   ii. Identify the first and last addresses.
   iii. Identify the class for the IP address.
   iv. Design the subblocks for each office (new mask, first address and last address)

3. An IPv4 packet has arrived with the hexadecimal digits below. Identify all the fields of the IP header.

   0x452003c5780600003406ca1fd155ad71c0a8017e

4. The value of the total length field in an IPv4 datagram is 36 bytes, and the value of the header length field is 5. How many bytes of data is the packet carrying?

5. In an IPv4 datagram, the value of total length field is $(00A0)_{16}$ and the value of the HLEN is $(5)_{16}$. How many bytes of payload are being carried by the datagram?

6. An IPv4 datagram is carrying 1024 bytes of data. If there is no option information, what is the value of the header length field? What is the value of the total length field?

7. Answer the following questions regarding fragmentation:
   i. Where an IP datagram may get fragmented?
   ii. Where are the IP datagram fragments reassembled?
   iii. How to prevent an IP datagram from being fragmented?
   iv. What happens when a datagram must be fragmented to traverse a network, but the "don't fragment" flag in the datagram is set?
   v. Will all the fragments of a datagram reach the destination using the same path?
   vi. What happens to the original IP datagram when one or more fragments are lost?
   vii. Will all the fragments of a datagram arrive at the destination system in the correct order?

8. A packet has arrived in which the offset value is 300 and the payload size is 100 bytes. What are the number of the first byte and the last byte?

9. 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. Fill in the table below to show how the fragments are being generated.

Original IP Datagram					
Sequence	**Identifier**	**Total Length**	**DF**	**MF**	**Offset**
0	**422**	**2400**	**0**	**0**	**0**

IP Fragments (Ethernet)					
Sequence	**Identifier**	**Total Length**	**DF**	**MF**	**Offset**