

**Homework #4**  
**(Due on 12:00am, Thursday, Nov. 17th, 2016)**

- Why is the Internet Protocol (IP) described as the "narrow waist" of the network stack?
  
- What are the two key functions of the network layer that each router performs? Please explain the difference between them.
  
- Assume you have a 3,000 byte long datagram which needs to be fragmented for a 1,400 bytes MTU. Please fill the following table:

Datagram Number	Length	Fragmentation Flag	Offset

- Convert the following IP addresses into their binary notion:
  - 192.168.0.1
- Convert the following IP address into it's decimal notion
  - 11100011100001100000111110101010
  
- A provider has been assigned the network 128.30.0.0/23 and wants to divide it among three customers. Customer A needs to accommodate up to 220 hosts, customer B needs to accommodate up to 110 hosts and customer C needs to accommodate up to 80 hosts. Please fill the following table with the details of the subnetworks that the provider can create to fit its customers' needs.

Subnet No.	Network Address	Netmask	Host range	No. of Hosts
1				
2				
3				
4				
5				

- Consider IP addresses: How does a host get an IP address? How does a network get the subnet part of an IP address? How does a provider get a block of IP addresses? What is the principle behind these procedures?
- What problem is tackled by Network Address Translation (NAT)? Please briefly describe what NAT does.
- Consider IPv6 What are the main differences between IPv4 and IPv6? What are two approaches towards the transition between IPv4 and IPv6?