Exercise #5
(Solutions on December 10th, 2020)

1. What are the two key functions of the network layer that each router performs? Please explain the difference between them.

2. Assume you have a 3,000 byte long datagram which needs to be fragmented for a 1396 bytes MTU. Please fill the following table:
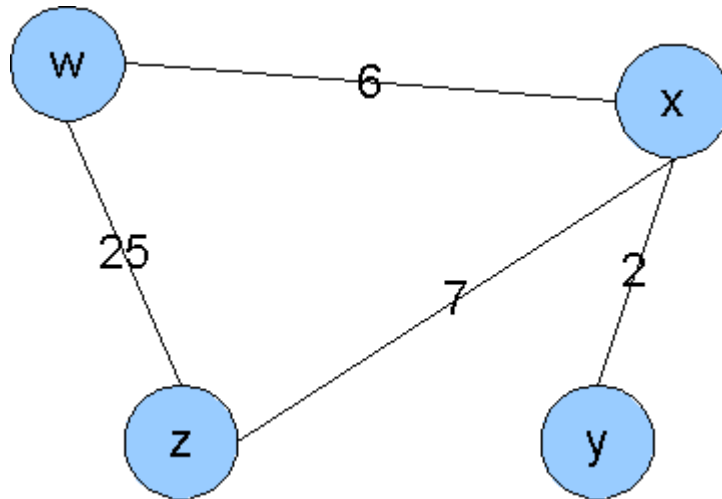
Datagram Number	Length	Fragmentation Flag	Offset

3. 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				

4. What problem is tackled by Network Address Translation (NAT)? Please briefly describe what NAT does.

5. What are the main differences between IPv4 and IPv6? What are two approaches towards the transition between IPv4 and IPv6?

6. Compare Link State routing algorithms to Distance Vector algorithms in terms of scalability and robustness.

7. What is the difference between Intra-AS and Inter-AS routing? Why are different routing protocols needed for each? Name one example for each category.

8. Given the following network, use the Distance Vector algorithm to find the least cost paths for all nodes. Fill the provided tables and indicate with arrows between the tables when a node sends a distance vector to another node.

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Node w		cost to			
		w	x	y	z
from	w				
	x				
	y				
	z				

Node w		cost to			
		w	x	y	z
from	w				
	x				
	y				
	z				

Node w		cost to			
		w	x	y	z
from	w				
	x				
	y				
	z				

Node w		cost to			
		w	x	y	z
from	w				
	x				
	y				
	z				

Node x		cost to			
		w	x	y	z
from	w				
	x				
	y				
	z				

Node x		cost to			
		w	x	y	z
from	w				
	x				
	y				
	z				

Node x		cost to			
		w	x	y	z
from	w				
	x				
	y				
	z				

Node x		cost to			
		w	x	y	z
from	w				
	x				
	y				
	z				

Node y		cost to			
		w	x	y	z
from	w				
	x				
	y				
	z				

Node y		cost to			
		w	x	y	z
from	w				
	x				
	y				
	z				

Node y		cost to			
		w	x	y	z
from	w				
	x				
	y				
	z				

Node y		cost to			
		w	x	y	z
from	w				
	x				
	y				
	z				

Node z		cost to			
		w	x	y	z
from	w				
	x				
	y				
	z				

Node z		cost to			
		w	x	y	z
from	w				
	x				
	y				
	z				

Node z		cost to			
		w	x	y	z
from	w				
	x				
	y				
	z				

Node z		cost to			
		w	x	y	z
from	w				
	x				
	y				
	z				