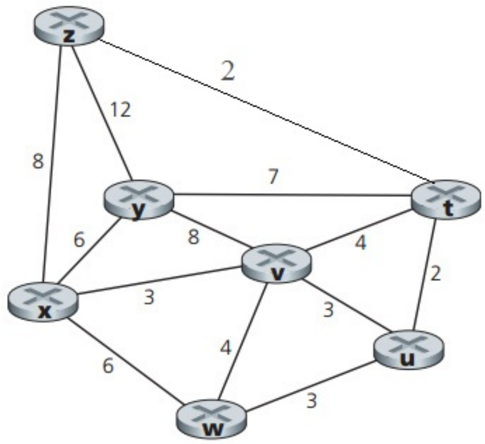
Problem 1

Consider the following network of routers where the numbers above each link indicate link costs:



Considering calculations from the perspective of node **z**:

1. Show a table showing iterations of the Link State routing algorithm.
2. Show a resulting routing table (next hop for each destination).

1.

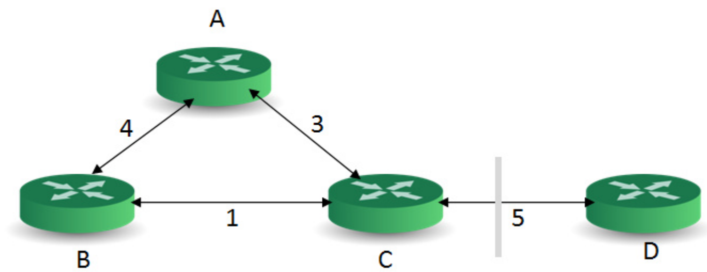
Step	N	y	x	v	t	w	u
0	z	12	8	inf	2	inf	inf
1	zt	9	8	6		inf	4
2	ztu	9	8	6		7	
3	ztuv	9	8			7	
4	ztuvw	9	8				
5	ztuvwx	9					
6	ztuvwxy						

2.

Destination	Next Hop
t	z
u	t
v	t
w	u
x	z
y	t

Problem 2

Consider a network of 4 routers running Distance Vector routing algorithm where the numbers above each link indicate link costs.



1. Suppose, the link between C and D fails. Show that split horizon will not eliminate the count-to-infinity problem.

2. How can split horizon with poisoned reverse help in eliminating the count-to-infinity problem when the link between C and D fails?

1. Suppose A, B do not tell C they can reach D. When CD failure happens, A knows B can reach D, so A sends route to C to go to B. B then sends route to A, A updates the route and sends to C again. This loop continues forever, and the path length is incremented by the link cost each time.

2. If A B tells C that B's and C's distance to D is infinity, then when CD's connection is lost, C has no way to reach D. Then C will tell A that fistance to D is infinity.

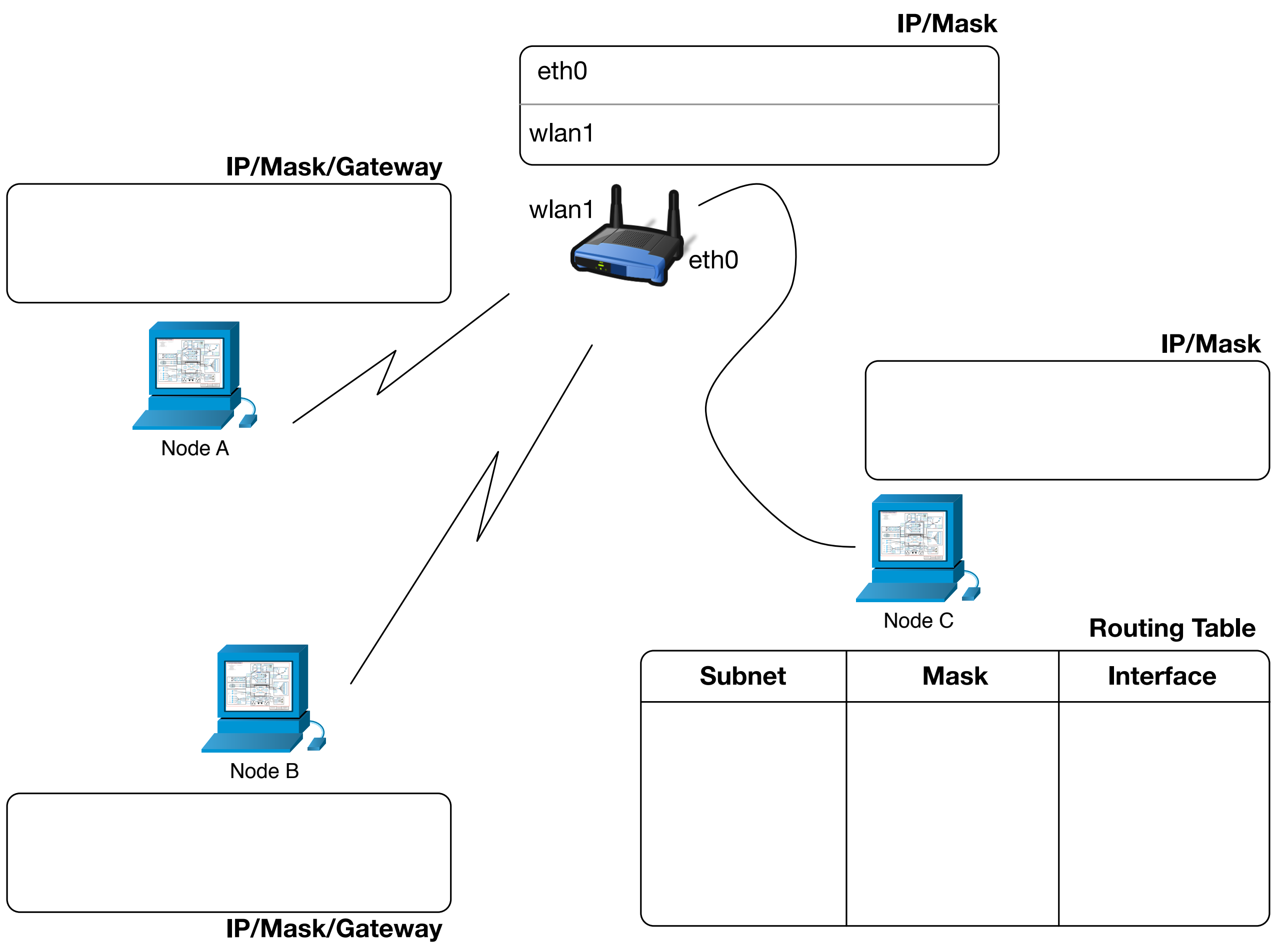
Problem 3

Consider a simple network with one WiFi router and 3 hosts on the Figure. Host A and B are connected to the router over wireless interface, host C is connected using wired Ethernet interface.

1. Assign IP (IPv4) addresses, network masks, and next hop gateways (where applicable) addresses so that all of them can communicate with each other.

   Consider that have been given 131.179.196.32/27 address block and all assignments should be made from that block. **Your assignment must use the most conservative IP address allocation.** That is, assign IP addresses to hosts using as many network bits (the largest possible subnet mask) as possible.

2. Fill the content of the Host C's routing table, **without using the default route**.



Node A: 131.179.196.1 / 255.255.255.248 / 131.179.196.3
Node B: 131.179.196.2 / 255.255.255.248 / 131.179.196.3
Node C: 131.179.197.1 / 255.255.255.248
Router:
wlan: 131.179.196.100
etho: 131.179.197.100

Problem 4

Answer the following questions regrading to IP.

1. Suppose Host A receives an IP datagram. How does the network layer in Host A know it should pass the segment (that is, the payload of the datagram) to TCP rather than to UDP or to something else?
2. Can a host have more than one IP address? Justify your answer briefly.
3. How does Skype work between two hosts which are behind two different NAT boxes?
4. Compare IPv4 and IPv6 headers. What are the common fields?

1.The protocol field of the received IP datagram has information about which protocol the destination (host A) should use.

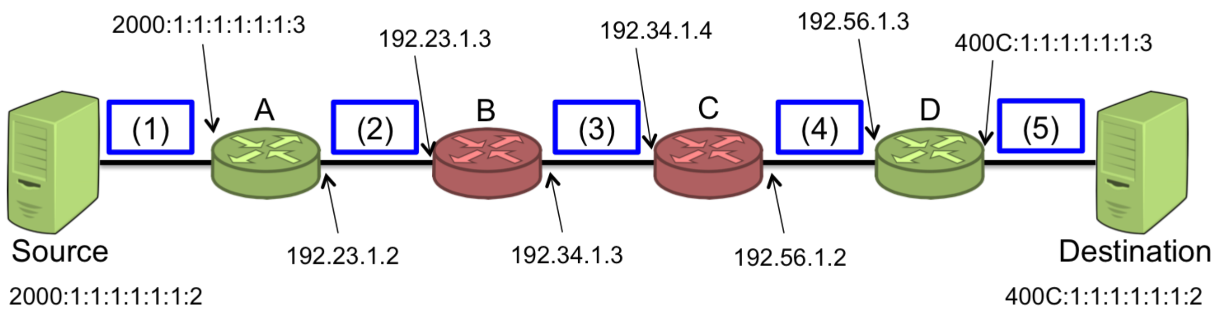
2.Yes. IP address is numerical values to devices that uses IP, so a host can have multiple IP address if there are multiple routes passing the host.

3.The clients both connects to the supernode, who connect the clients together.

4.Destination, Source and Version are kept same. "Total length" is renamed "payload length" in IPv6, subtracting the lenth of the header. IHL (Internet Header Length), identification, flags are deleted in IPv6 header. TTL is renamed to "Hop Limit" in IPv6.

Problem 5

Consider a network with four routers. Router A and D are IPv6 routers while router B and C are IPv4 routers. Assume that the source host sends an IPv6 packet to the destination host. The blue boxes in the figure represent the packet's location. Show source IP address and destination IP address of the packet located at (1) through (5).



1:
src:2000:1:1:1:1:1:1:2
dest:400c:1:1:1:1:1:1:2
2:
src:2000:1:1:1:1:1:1:3
dest:400c:1:1:1:1:1:1:3
3:
src:192.34.1.4
dest:192.56.1.2
4:
src:2000:1:1:1:1:1:1:3
dest:400c:1:1:1:1:1:1:3
5:
src:2000:1:1:1:1:1:1:2
dest:400c:1:1:1:1:1:1:2