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Question 1

A) In step 1

- i) Packet from Bob to X: ***Source IP: 172.16.0.2 (Bob's IP), Destination IP: 129.10.8.8 (X's IP)***
- ii) Packet from X to S: ***Source IP: 129.10.8.8 (X's IP), Destination IP: 52.113.194.22 (S's IP)***

B) In step 4

- i) Packet from Bob to X: ***Source IP: 172.16.0.2 (Bob's IP), Destination IP: 129.10.8.8 (X's IP), Source PORT: 7201 (Bob), Dest PORT: 4501 (X)***
- ii) Packet from X to P: ***Source IP: 129.10.8.8 (X's IP), Destination IP: 73.15.20.6 (P's IP), Source PORT: 4501 (X), Dest Port: 5401 (P)***

C) Just after step 4, the NAT table entry-

- ***Entry 1: <172.16.0.2,7201> (Bob's IP and PORT)***

D) In step 7

- i) Packet from P to X: ***Source IP: 73.15.20.6 (P), Dest IP: 129.10.8.8 (X), Source Port: 5401 (P), Dest Port: 4501 (X)***
- ii) Packet from X to Bob: ***Source IP: 129.10.8.8 (X), Dest IP: 172.16.0.2 (Bob), Source Port: 4501 (X), Destination Port: 7201 (Bob)***

Question 2

A-D)

S3 FLOW TABLE	
Match	Action
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IP Source: 10.1.** ; IP Dest: 10.2.**	Forward(4)

S3 FLOW TABLE	
IP Source: 10.2.** ; IP Dest: 10.1.**	Forward(3)
IP Source: 10..* ; IP Dest: 10.3.0.6 (h6)	Forward(1)
IP Source: 10.1/2.** ; IP Dest: 10.3.0.5 (h5)	Forward(2)
IP Source: 10.3.0.5 (h5); IP Dest: 10.1/2.**	Forward(3)
IP Source: 10.3.0.6 (h6) ; IP Dest: 10.1/2.**	Forward(4)

Question 3

A) Dijkstra's Algorithm Table:

Step	N'	(D(s), p(s))	(D(t), p(t))	(D(u), p(u))	(D(v), p(v))	(D(w), p(w))	(D(x), p(x))	(D(y), p(y))	(D(z), p(z))
1	['z']	(inf, 's')	(inf, 't')	(inf, 'u')	(inf, 'v')	(inf, 'w')	(inf, 'x')	(inf, 'y')	(0, 'z')
2	['w', 'z']	(12, 's')	(7, 't')	(inf, 'u')	(inf, 'v')	(1, 'w')	(inf, 'x')	(6, 'y')	(0, 'z')
3	['v', 'w', 'z']	(12, 's')	(5, 't')	(inf, 'u')	(4, 'v')	(1, 'w')	(5, 'x')	(4, 'y')	(0, 'z')
4	['v', 'w', 'y', 'z']	(12, 's')	(5, 't')	(8, 'u')	(4, 'v')	(1, 'w')	(5, 'x')	(4, 'y')	(0, 'z')
5	['t', 'v', 'w', 'y', 'z']	(12, 's')	(5, 't')	(8, 'u')	(4, 'v')	(1, 'w')	(5, 'x')	(4, 'y')	(0, 'z')
6	['t', 'v', 'w', 'x', 'y', 'z']	(10, 's')	(5, 't')	(6, 'u')	(4, 'v')	(1, 'w')	(5, 'x')	(4, 'y')	(0, 'z')
7	['t', 'u', 'v', 'w', 'x', 'y', 'z']	(10, 's')	(5, 't')	(6, 'u')	(4, 'v')	(1, 'w')	(5, 'x')	(4, 'y')	(0, 'z')

Step	N'	(D(s), p(s))	(D(t), p(t))	(D(u), p(u))	(D(v), p(v))	(D(w), p(w))	(D(x), p(x))	(D(y), p(y))	(D(z), p(z))
8	['s', 't', 'u', 'v', 'w', 'x', 'y', 'z']	(10, 's')	(5, 't')	(6, 'u')	(4, 'v')	(1, 'w')	(5, 'x')	(4, 'y')	(0, 'z')

B) Forwarding Table:

Destination	Link	Cost
s	(z,w(w,t(t,s)))	10
t	(z,w(w,t))	5
u	(z,w(w,v(v,t(t,u))))	6
v	(z,w(w,v))	4
w	(z,w)	1
x	(z,w(w,x))	5
y	(z,(w,y))	4
z	-	0

Question 4

The following responses assume that the AS path is the primary criterion for route selection in BGP.

A) For router 1c in AS1 to reach the prefix 167.25.23.0/24:

The AS level route selected by router 1c would likely be based on the BGP path attributes, primarily the AS path. Assuming that AS1 is a customer of both AS2 and AS3, the BGP route selection process would prefer the path with the shortest AS path. Therefore, router 1c would select the route through AS2 because [AS2 AS9 AS13] has a shorter AS path than [AS3 AS5 AS7].

B) For router 1a in AS1 to reach the prefix 167.25.23.0/24:

If AS1 is a customer of AS2 but not AS3, router 1a would prefer the path through AS2. The AS path [AS2 AS9 AS13] would be selected as the route to reach the prefix 167.25.23.0/24.

C) Is AS prefix 167.25.23.0/24 multi-homed?

Yes, AS prefix 167.25.23.0/24 is multi-homed because it is reachable through both AS3 and AS2. Router 1a in AS1 advertises the prefix with the path [AS3 AS5 AS7], and router 1b advertises it with the path [AS2 AS9 AS13]. In other words, it is advertised from multiple ASes.

Question 5 A)

The DHCP client's subsequent DHCP request is broadcast rather than addressed specifically to the offering server because there may be multiple DHCP servers on the network, and the client wants to confirm and finalize the IP address lease with the specific server that initially made the offer. By broadcasting the DHCP request, the client ensures that all DHCP servers on the network are aware of its decision. This helps prevent conflicts and ensures that the client obtains the offered IP address from the intended server, even in environments with multiple DHCP servers.