Networks Homework 9 (Due Friday 10/30/2020)

1. True or false.

   (a) NAT routers usually use port numbers to determine which internal machine should get an incoming packet.

   (b) If two people behind NATs want to communicate, one option is to find a server that each could send stuff to and have that server forward that stuff along to the other side.

   (c) Whenever you rejoin a network that you were previously on, DHCP will randomize your new address to make sure you don't get an address you previously had on the network.

   (d) If a network is not running DHCP and if there is no network administrator to statically assign IPs, then there is no way to get an address to use to communicate on that network.

   (e) ARP queries are typically broadcast to the entire local network.

   (f) In OSPF, each router sends a copy of its entire table to all its neighbors.

   (g) If your friend has MAC address 12-34-56-AA-BB-CC and you send a packet to that MAC address, then your friend will get it, even if she is on a different network than you.

   (h) Sometimes, ∞ can equal 16.

   (i) The purpose of RIP and OSP is so that routers know whom to forward packets to.

2. An IP of one of the interfaces on my computer is 169.254.135.69. Who can send me stuff at that address?

   (a) Anyone worldwide

   (b) Just myself

   (c) Others on the same local network as me

   (d) No one.

3. If everyone in the classroom is connected to MSMWireless and googles "what is my ip?" we will all get the same answer. Why?

   (a) We're all sharing an address via NAT.

   (b) DHCP has given us all the same address.

   (c) "What is my IP?" returns a routing prefix, not an actual address, and though we don't all have the same IP address, we are on the same network, so we all have the same routing prefix.

   (d) The classroom's IP address was statically allocated by someone in Networking, and when we're in the classroom, the Wi-Fi access point all assigns us that same IP.

4. Use a command-line tool or your OS's settings to find when your current DHCP lease expires. Include a screenshot. You don't need to have anything else in the screenshot other than the lease part.

5. Use a command-line tool or your OS's settings to find your MAC address. Include a screenshot showing just the first two characters of the MAC address. For privacy's sake, I don't want to see the whole address.

6. Use a command-line tool or your OS's settings to show your ARP tables. Include a screenshot showing just one of the static entries.

7. Use Wireshark to capture an ARP packet. Include a screenshot. [Hint: use the filter ARP in the filter window. You might need to wait a few minutes before you get one.]

8. In RIP, if router A tells router B about a route that B is already a part of, that can lead to a problem where routing entries keep growing in size. What is that problem called?

9. Who makes the device that has this MAC address f0-9f-c2-12-34-56?

10. Suppose you check your router's IP given to it by your ISP, and you see that it's 100.202.111.165. Most of the internet will not be able to initiate a connection to your router at that address. Why?

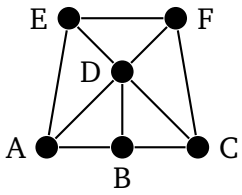
11. Consider the network below, where RIP is being used to manage routing on the network. The routing tables of A and B are shown. Suppose B sends out a periodic update to its neighbors. What will A's table look like after the update?

A's table

B	C	D	E	F
1	3	1	1	∞

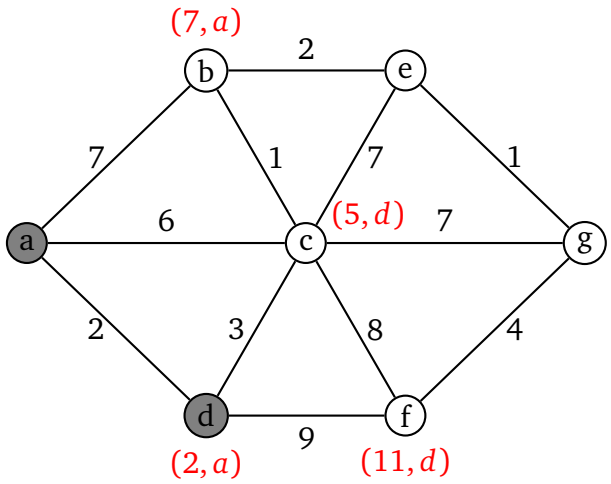
B's table

A	C	D	E	F
1	1	1	2	2



12. Shown below is a graph in which the shortest path from a to g is being sought by Dijkstra's Algorithm in OSPF. The first few steps have already been done and the results are indicated on the graph. The gray shaded vertices have already been chosen and searched.

    Perform the next step (and only that step) and indicate the results on the graph. In particular, please indicate which vertex is chosen next and how the labels change on the graph.



13. At the end of a Dijkstra's algorithm search from vertex e in a graph (not the graph above), we have the following list of labels. Use that to fill in the routing table for e (on the right) showing both the costs and the first hop.

vertex	label
a	$(8, d)$
b	$(2, e)$
c	$(3, b)$
d	$(6, c)$
f	$(5, g)$
g	$(1, e)$

e's table	a	b	c	d	e	f	g
cost					–		
first hop							