CSE 677: Homework 3 (Revised: Nov 9)

Due Date: Nov 14 (Mon), Total: 40 points

1. **(4 points)** Consider the *virtual circuit network* shown below where the IP addresses of the interfaces of the hosts are $H1$, $H2$, $H3$ and $H4$. There is an ongoing call betwen $H1$ and $H3$ and another ongoing call between $H2$ and $H4$. The interface numbers are marked for each router.

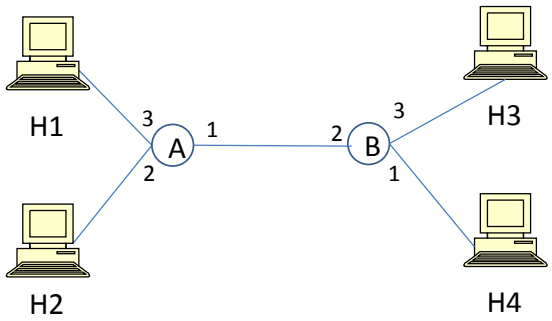

Figure 1:

   (a) Create a forwarding table for router A.

   (b) Given the forwarding table that you created, now create a forwarding table for router B.

2. **(4 points)**

   Suppose a network uses 32-bit host addresses. Consider the following forwarding table at a router with four links. Create a forwarding table that forwards according to the ranges specified below and has five entries. Assume that longest prefix matching is being used. You may use "otherwise" or "default" as one of the five entries.

Destination Address Range	Link Interface
11100000 01000000 00000000 00000000 through 11100000 01000000 01111111 11111111	0
11100000 01000000 10000000 00000000 through 11100000 01000000 10000000 11111111	1
11100000 01000000 10000001 00000000 through 11100000 11111111 11111111 11111111	2
otherwise	3

3. **(5 points)** A router using longest prefix matching has the following forwarding table:

Prefix Match	Interface
011	0
0	1
10	2
11	3

   For the four interfaces give the associated range of host addresses and the number of addresses in that range. Assume that the network is using 8-bit addresses.

4. **(4 points)**

Consider the following network. With the indicated link costs, use Dijkstra's shortest-path algorithm to compute the shortest path from v to all network nodes. Show how the algorithm works by computing a table similar to Slide 4-9 (ch4-part4.ppt).

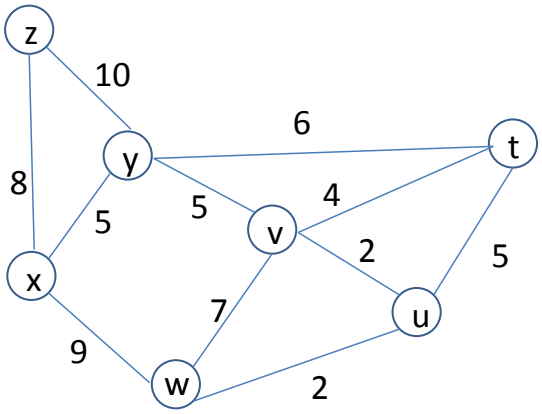

Figure 2:

5. **(4 points)** Consider the network shown below, and assume that each node initially knows the costs to each of its neighbors. Consider the distance-vector algorithm and show the entries in the distance vector tables until they converge as shown in Slide 4-18 (ch4-part4.ppt). Make sure you show till the timestep when all the distance vectors remain the same as in the previous timestep. This shows that all the vectors have converged.

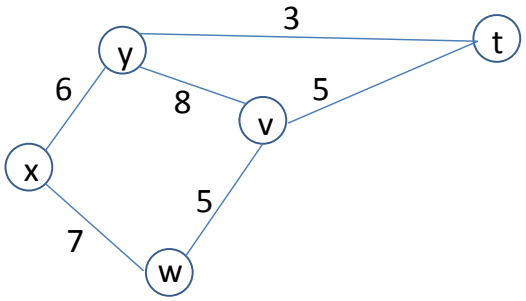

Figure 3:

6. **(4 points)** Some web sites provide report on the Internet "weather" by performing periodic pings. One such site is `http://www.internettrafficreport.com`. Which router is the worst in North America in terms of the "Current Index"? Ignore the routers that are not responsive (Current Index = 0). How is the index calculated? Submit a printout showing the current indices in North America.

7. **(4 points)** Read RFC 2526. What is anycasting? Give at least one use/application of anycasting.

8. **(6 points)** Read the manpage of *netstat*. The full path of netstat is */bin/netstat*. Use a CSE sun machine for this question. **You must submit a printout of the output and explain the output for all parts of this question.**

   (a) (2 points) Using *netstat* (with appropriate options) obtain the routing table of the machine you are logged on to. The destination network addresses and gateways must appear as names rather than IP addresses. Explain all the lines and fields of the output.

   (b) (2 points) Using additional option(s) print the routing table such that the destination addresses and gateways appear as IP addresses rather than names. Explain all the lines and fields of the output.

   (c) (2 points) What are the *-i* and *-s* options used for? Explain the output of *netstat -i* and *netstat -s*.

9. **(5 points)** Go to http://www.networldmap.com. Follow the link to "World IP Address Map".

(a) (3 points) Try out at least four different IP addresses and see if the tool is able to locate the machines correctly. Comment on its accuracy based on the results of the lookups.

(b) (2 points) Why is it useful to know the location of all IP addresses? Give two reasons.