Spring 2015 COMP4621 Homework Assignment #4
Due Date: May 7, 2015 (Thursday)

Name: _____ ID: _____
E-Mail: _____ Section L __

Please read the following instructions carefully before answering the questions:

- This assignment must be completed **individually**.
- When you write your answers, please try to be precise and concise.
- Fill in your name, student ID, email and Section number at the top of the first page.
- Please print this homework and fill in your answers in the space provided, or you can type your answers in the MS word file and print it out.
- **Homework Collection:** the **hardcopy** is required and the homework is collected at the **Collection BOX** outside **Room 4030 (Lift 1).**

1. (30 points) Please briefly answer the following questions in 2-3 sentences only.

   (a) Please specify the two major functions in the forwarding process? (4 points)

   (b) Why does a virtual circuit network need a routing (forwarding) table at each input port while there is only one routing table in the IP network? (4 points) (Hint: VC identifier and IP address)

   (c) What are the two functions in a universal plug-and-play (UPnP) Internet Gateway Device (IGD) protocol? (4 points)

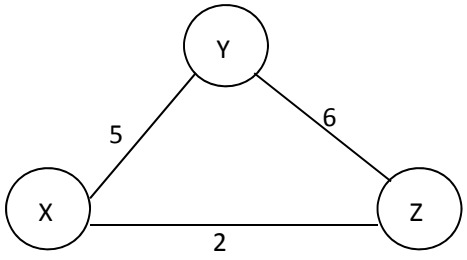
(d) Please describe the key idea in the Poisoned Reverse method in a distance vector routing protocol? What problem does it solve? (4 points)

(e) What is DHCP? What does a DHCP do? (4 points)

(f) How does a *traceroute* program utilize an ICMP message for terminating the *traceroute*? (6 points) (Hint: Please consider both source and destination actions)

(g) What is the main difference between a link-state algorithm and a distance vector algorithm? (4 points)

2. (20 points) Consider the three-node topology shown in the following picture. Compute the distance tables after the initialization step and after each iteration of a synchronous version of the distance-vector algorithm.



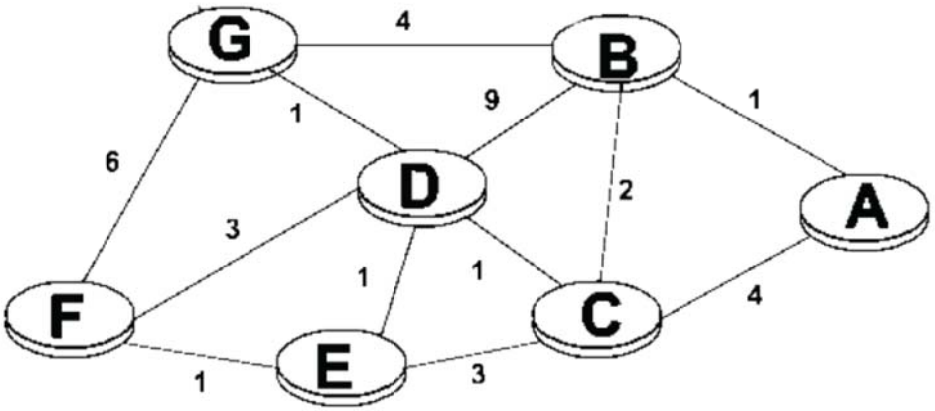
X Tab		Cost to		
		X	Y	Z
From	X			
	Y			
	Z			

Y Tab		Cost to		
		X	Y	Z
From	X			
	Y			
	Z			

Z Tab		Cost to		
		X	Y	Z
From	X			
	Y			
	Z			

1st round

3. (25 points) Consider the following network. With the indicated link costs, use Dijkstra's shortest path algorithm to compute the shortest path from node A to all network nodes. Show how the algorithm works by computing a table similar to in the lecture notes.



4. (25 points)

Subnet Number	Subnet Mask	Next Hop
128.96.39.0	255.255.255.128	interface 0
128.96.39.128	255.255.255.128	interface 1
128.96.40.0	255.255.255.128	R2
192.4.153.0	255.255.255.192	R3
default		R4

Subnet Number	NextHop
128.96.39.0/25	interface 0
128.96.39.128/25	interface 1
128.96.40.0/25	R2
192.4.153.0/26	R3
default	R4

A so-called subnet mask is often used to indicate the number of leading bits that constitute the network address in a CDIRized IP network. For example, a 23-bit network address would have a subnet mask of 11111111.11111111.11111110.0000 or 255.255.254.0. Thus, the two tables above are equivalent.

Also, a router table typically has a so-called "default" entry. That is, no match with any table entries can be found for a destination IP address, the NextHop indicated by the default entry will be used to forward the IP packet.

Suppose a router has built up the routing table shown above. The router can deliver packets directly over interfaces 0 and 1, or it can forward packets to routers R2, R3, or R4. Determine which Next Hop the router will use for IP packets addressed to each of the following destinations:

(a) 128.96.39.10 (5 points)

(b) 128.96.40.12 (5 points)

(c) 128.96.40.151 (5 points)

(d) 192.4.153.17 (5 points)

(e) 192.4.153.90 (5 points)