COMP3234 Computer and Communication Networks / ELEC3443 Computer Networks
Written Assignment 2

Q1. Consider a datagram network using 32-bit host addresses. Suppose a router has four links, numbered 0 through 3, and packets are to be forwarded to the link interfaces as follows:

(a) Provide a forwarding table that has five entries, uses longest prefix matching, and forwards packets to the correct link interfaces.

Destination Address Range	Link Interface
11100000 00000000 00000000 00000000 through 11100000 00000000 11111111 11111111	0
11100000 00000001 00000000 00000000 through 11100000 00000001 11111111 11111111	1
11100000 00000010 00000000 00000000 through 11100001 11111111 11111111 11111111	2
Otherwise	3

(b) Describe how your forwarding table determines the appropriate link interface for datagrams with destination addresses:

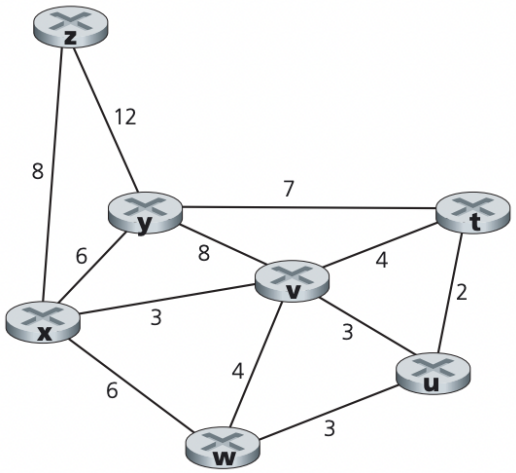
11111000 10010001 01010001 01010101
11100000 00000000 11000011 00111100
11100001 10000000 00010001 01110111

Q2. Consider a subnet with prefix 168.0.0.16/28.

(a) Give an example of one IP address (of form xxx.xxx.xxx.xxx) that can be assigned to this network.

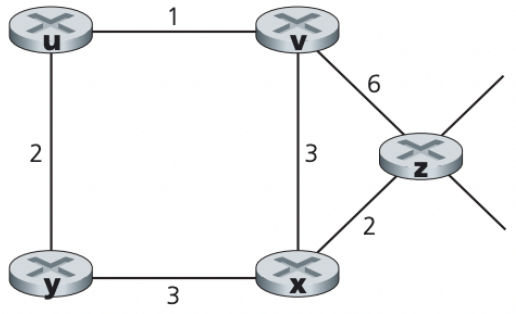
(b) Suppose an ISP owns the block of addresses of the form 168.0.0.16/28. Suppose it wants to create four subnets from this block, with each block having the same number of IP addresses. What are the prefixes (of form a.b.c.d/x) for the four subnets?

Q3. Consider the following network. With the indicated link costs, use Dijkstra's shortest-path algorithm to compute the shortest path from x to all network nodes. Show how the algorithm works by computing a table below.



Step	N'	D(t),p(t)	D(u),p(u)	D(v),p(v)	D(w),p(w)	D(y),p(y)	D(z),p(z)
0	x						
1							
2							
3							
4							
5							
6							

Q4. 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 distance table entries at node z.



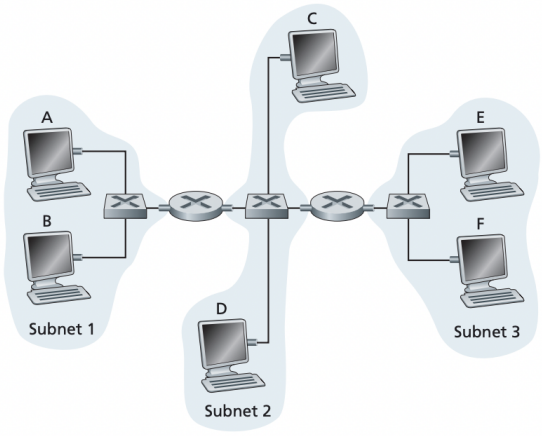
Q5. Compute the Internet checksum for each of the following:

(a) The binary representation of the numbers 1 through 6.

(b) The ASCII representation of the letters C through H (uppercase).

(c) The ASCII representation of the letters c through h (lowercase).

Q6. Consider three LANs interconnected by two routers in the following figure.



(a) Assign IP addresses to all of the interfaces. For Subnet1 use addresses of the form 192.168.1.xxx; for Subnet 2 use addresses of the form 192.168.2.xxx; and for Subnet 3 use addresses of the form 192.168.3.xxx.

(b) Assign MAC addresses to all of the adapters.

(c) Consider sending an IP datagram from Host E to Host B. Suppose all of the ARP tables are up to date. Enumerate all the steps (including the outgoing IP address interface and Ethernet destination address) at each router along the path.