1. (10 points)

In a packet switched network with distance vector routing, node 1's table is initialized as follows:

Table 1: Node 1 routing table

Destination Node	Cost	Next Node
1	0	–
2	4	2
3	1	3
4	∞	–
5	∞	–

Node 1 next receives the following cost vector updates from its neighbors:

Table 2: Node Cost Vectors

Distance to Node	Node 2	Node 3
1	4	1
2	0	5
3	3	0
4	1	5
5	5	3

What does Node 1's routing table look like after the update?

Table 3: Node 1 routing table

Destination Node	Cost	Next Node
1	0	–
2		
3		
4		
5		

2. (10 points)
For the following graph G, use Dijkstra's algorithm to find the shortest paths from a to all other nodes. You must show all steps (iterations) starting with all temporary labels equal to ∞. And clearly showing which labels become permanent at each iteration and which nodes get temporary labels at each iteration.

Step	N'	D(a),p(a)	D(b),p(b)	D(c),p(c)	D(d),p(d)	D(e),p(e)	D(f),p(f)	D(g),p(g)	D(z),p(z)
0	-	0,-	∞,-	∞,-	∞,-	∞,-	∞,-	∞,-	∞,-
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									

3. (10 points total)

Suppose a small business network using NAT is connected to a router that has an external WAN IP address of 111.13.89.67. There are three hosts connected to the network, which has an internal address of 19.16.0.0/16. The internal addresses are 19.16.0.1, 19.16.0.2, and 19.16.0.3 for each host. The router internal address is 19.16.0.4. Suppose a host located at 19.16.0.2 requests *two* TCP connections to a web server located at 128.119.40.110. The two connections use the host's local ports 3400 and 3401.

(a) (10 points) Show valid source and destination IP addresses and port numbers for each of the 2 connection requests on both the LAN and WAN side of the router (start numbering NAT port assignments at port 6000).

LAN		WAN	
Source	Dest.	Source	Dest

(b) (10 points) Show valid source and destination IP addresses and port numbers for each of the server responses for the 2 connection requests on both the WAN and LAN side of the router.

WAN		LAN	
Source	Dest.	Source	Dest