1. Compare and contrast link-state and distance-vector routing algorithms.

   The link-state routing algorithms have the global knowledge on the network to compute least-cost path between source and destination. The distance-vector routing algorithms does not, instead has the least-cost path determined via iteration over all single node's directly connected neighbor(s). The link-state routing algorithms are more centralized in which a change in link cost will be sent to all node. The distance-vector routing algorithms are more decentralized in which a change in link cost will only be sent to the connected node only if the change alter the least-cost path to that connected node.

2. Why are different inter-AS and intra-AS protocols used in the Internet?
   Inter-AS: between multiple autonomous systems, focus more on policy
   Intra-AS: within a single autonomous system, focus more on performance
   Inter-AS: admin wants control over routed traffic, scaling over number of networks
   Intra-AS: no policy between multiple autonomous systems needed

3. Consider the seven-node node shown in the following figure. Using Dijkstra's algorithm, and showing your work, compute the shortest path from T to all other network nodes.

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	∞	∞	3,x	6,x	6,x	8,x
1	xv	7,v	6,v	3,x	6,x	6,x	8,x
2	xvu	7,v	6,v	3,x	6,x	6,x	8,x
3	xvuw	7,v	6,v	3,x	6,x	6,x	8,x
4	xvuwy	7,v	6,v	3,x	6,x	6,x	8,x
5	xvuwyt	7,v	6,v	3,x	6,x	6,x	8,x
6	xvuwytz	7,v	6,v	3,x	6,x	6,x	8,x

4. Consider the count-to-infinity problem in distance-vector routing.

   a. Will the count-to-infinity problem occur if we decrease the cost of a link? Why or why not?
      No, the count-to-infinity problem will not occur. The reason is because simply decrease in link cost will not result in a loop.

   b. How about if we connect two nodes which do not have a link?
      Connecting two nodes do not have a link with a link is equivalent to make link weight from infinite to finite.

5. Describe how loops in paths can be detected in BGP.

   BGP has a built in loop detection via the AS-PATH attribute. The router can detect the loop if an AS appears multiple, two or more times. If AS path information is available from an AS to a destination in BGP would also detection would be possible when a BGP peer receives a route that contains its own AS number in the path. Then that would result in a loop. Loop establishment is possibly detected if a BGP peer receives a route contains its own AS number in the path. BGP