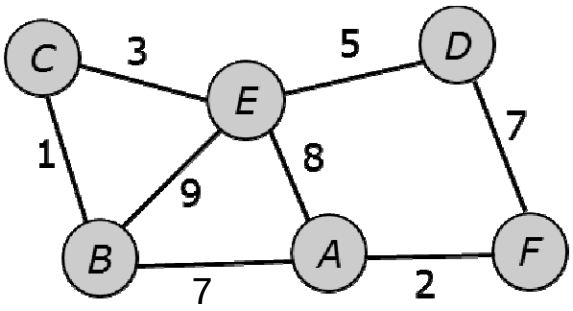
CSE 473 – Introduction to Computer Networks

Review Questions 19

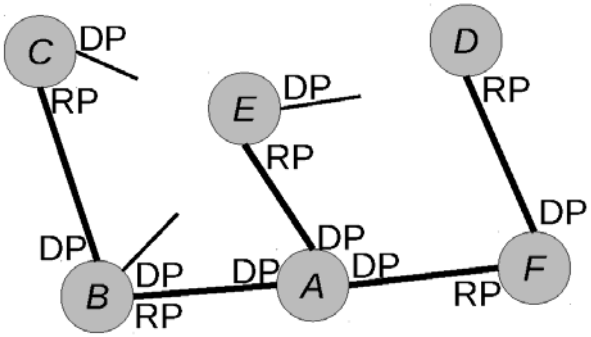
Your Name:

Please print out this form (two-sided, if you can) and write your answers *legibly* in the spaces provided. If you can't write legibly, type.

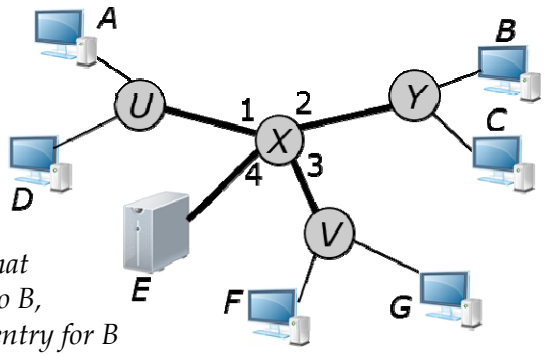
1. Consider the network on the right, where numbers are link costs and the letters represent switch IDs (A is lower than B). What would be the spanning tree for this network. Explicitly show RPs and DPs.



The answer is shown on the right.



2. Consider the network on the right that starts with empty forwarding tables. Assume that B sends an ARP query for E and G sends an ARP query for D. What will be the content of the forwarding tables at all switches after B and G receives the responses to Their ARP queries?



Both ARP queries are broadcast on the spanning tree, so that Y has an entry for B pointing to its local port connecting to B, X has an entry for B pointing to Y, and V and U have an entry for B pointing to X. Similarly, V has an entry for G pointing to its local port connecting to G, X has an entry for G pointing to V, and Y and U have an entry for G pointing to X.
The responses to the ARP queries are unicast to the senders, so that X has an entry for E pointing to its local port connecting to E, and Y has an entry for E pointing to X. Similarly, U has an entry for D pointing to its local port connecting to D, X has an entry for D pointing to U, and V has an entry for D pointing to X.

3. Consider again the network of problem 1, but assume it is now running MPLS. How many link-disjoint (they don't share any link) paths could E have to A, and what would then be the content of the routing tables at all routers to realize this?

   There are three possible link-disjoint paths from E to A, namely, E-C-B-A, E-A, and E-D-F-A.

   In order to realize those three paths, E needs three label switched paths for subnets associated with A, which will have C, A, and D as their next-hop, respectively. Let us assume that the three labels are distinct (they don't need to) and equal to L1, L2, and L3, for C, A, and D, respectively.

   C would then have an entry in its routing table mapping incoming label L1 to outgoing label $L1_B$ with B as its next hop, and B would have an entry mapping incoming label $L1_B$ to outgoing label $L1_A$ with A as its next hop.

   Because A is the destination, there is no need for an entry for incoming label L2 at A.

   D, like C, would have an entry in its routing table mapping incoming label L3 to outgoing label $L3_F$ with F as its next hop, and F would have an entry mapping incoming label $L3_F$ to outgoing label $L3_A$ with A as its next hop.