1. (7 points total) Consider the set of nine (9) IPv4 prefixes shown below

    0.0.0.0/0; 11.0.0.0/9; 8.0.0.0/5; 121.12.0.0/16; 120.0.0.0/7; 121.32.0.0/11; 121.12.36.0/23; 121.12.37.64/26; 121.12.37.96/32

    (5 points) For each prefix, identify which other prefixes, if any, it contains

    The 0.0.0.0/0 prefix contains all other eight prefixes.
    The most significant bits of the remaining prefixes are identified next and used to determine which other prefixes they contain.
    11.0.0.0/9 = 00001011.0*******.********.********
    8.0.0.0/5 = 00001***.********.********.********
    121.12.0.0/16 = 01111001.00001100.********.********
    120.0.0.0/7 = 0111100*.********.********.********
    121.32.0.0/11 = 01111001.001*****.********.********
    121.12.36.0/23 = 01111001.00001100.0010010*.********
    121.12.37.64/26 = 01111001. 00001100. 00100101.01******
    121.12.37.96/32 = 01111001. 00001100. 00100101.01100000

    Based on this, we conclude that
    11.0.0.0/9 does not contain any other prefix,
    8.0.0.0/5 contains 11.0.0.0/9,
    121.12.0.0/16 contains 121.12.36.0/23. 121.12.37.64/26, and 121.12.37.96/32
    120.0.0.0/7 contains 121.12.0.0/16, .12.36.0/23. 121.12.37.64/26, and 121.12.37.96/32
    121.32.0.0/11 does not contain any other prefix
    121.12.36.0/23 contains 121.12.37.64/26 and 121.12.37.96/32
    121.12.37.64/26 contains 121.12.37.96/32
    121.12.37.96/32 does not contain any other prefix

    (2 points) Identify the longest prefix match result from among the above nine (9) prefixes for the following IPv4 addresses
    11.132.66.224 and 121.12.37.73

    The longest prefix match for the first address is 8.0.0.0/5, while the longest prefix match for the second address is 121.12.37.64/26

2. (3 points total) Consider a network that runs the OSPF protocol and consists of two areas, area 0 and area 1, with two area border routers, A and B, connecting the two areas. Router A advertises into area 1 a cost of 14 to route r located in area 0, while router B advertises into area 1 a cost of 5 for the same route. Router C in area 1 has a cost of 2 to area border router A and a cost of 10 to area border router B.

    (1 points) Through which area border router does router C decide to reach r and what is its distance to r?

    Router C relies on a distance vector computation to determine its shortest path to r. It selects area border router B as its target exit point to reach r, and its distance to r is 10+5 = 15.

    (2 points) Area border router B needs to increase its cost to r from 5 to 10. How is this change advertised in area 1? Does it trigger a new Dijkstra computation in internal routers of area 1?

    The change will be advertised into area 1 by area border router B through a T3-summary LSA that will carry the new cost and an increased sequence number. The LSA will be flooded through area 1, and therefore received by all routers. It will, however, not trigger a Dijkstra computation since it is not associated with an internal topology change in area 1.