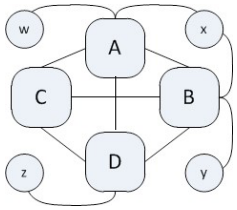
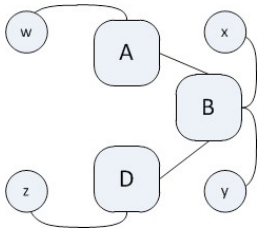
CSIT5610 Computer Networks: An Internet Perspective

Fall Semester 2022 -- Homework 3

Problems:

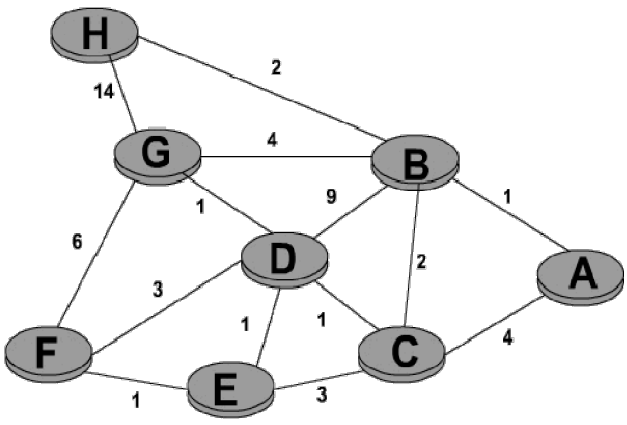
1. Consider the following figure on the left showing a partial graph of a network. A, B, C and D are Internet service provider (ISP) networks; w, x, y and z are customer stub networks. Assuming we use policy-based routing, draw the network topologies from the point of view of w, x and z respectively. We assume that we always choose the least-hops path first then the least traffic path. As an example, y's view is given on the right figure. Explain your choices for each topology. (20pts)



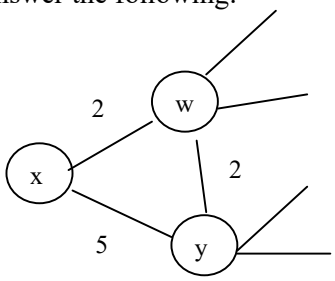


2. Suppose we have obtained the following block of IP address range from our ISP: 143.89.64.0/22
   a. What is the subnet mask for this network in binary and in quad dot decimal. explain.
   b. What is the broadcast address for this network? Explain why?
   c. Do the following addresses belong to this network or not? Explain why? 143.89.64.100, 143.88.64.1, 143.89.65.64, 143.89.67.64

3. Consider the following graph representation of a network, where link costs are indicated as labels on the edges. Use Dijkstra's algorithm to compute the shortest path from node F to all other nodes in the network. Use a table like that used in the notes to show how the algorithm proceeds. (20 points) When two nodes have the same path cost we will follow the alphabetical order.



4. Consider the network fragment shown in below. Node *x* has only two attached neighbours, *w* and *y*. Node *w* has a minimum-cost path to destination *u* (not shown) of 5, and *y* has a minimum-cost path to *u* of 6. The complete paths from *w* and *y* to node *u* are not shown. All link costs in the network are strictly positive integer values. Answer the following:



   a. Give x's distance vector for destinations w, y and u

   b. Give all possible link-cost changes for either c(x, w) or c(x, y) such that x will inform its neighbours of a new minimum-cost path to u as a result of executing the distance-vector algorithms.