Spring 2023 *Name*: _____________ID:________

CSCI 4311/5311 Homework # 2

Due: **May 5, 2023 (11:59 pm), via Moodle.**

The rules:

- All work must be your own. You are not to work in teams on this assignment.
- Submit as a single file (via moodle) containing a PDF file. Email me (ayn@cs.uno.edu) assignment only if moodle is not working.
- Do NOT attempt to cheat. If you get caught, you get F from the class and directly reported to the department and student affairs.
- If you cheat from your friend, I will assume that both of you are cheater and I will act accordingly.

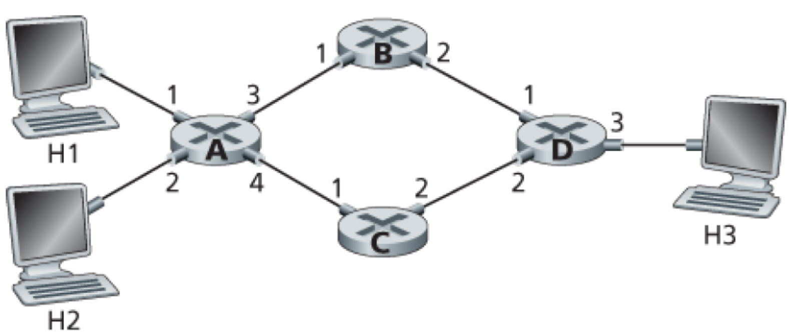
Total Marks = 100

(Q1) [15 points]

Consider the network below.

a. Show the forwarding table in router A, such that all traffic destined to host H3 is forwarded through interface 3.

b. Can you write down a forwarding table in router A, such that all traffic from H1 destined to host H3 is forwarded through interface 3, while all traffic from H2 destined to host H3 is forwarded through interface 4? (Hint: This is a trick question.)



(Q2) [15 points]

Consider a datagram network using 32-bit host addresses. Suppose a router has four links, numbered 0 through 3, and packets are to be forwarded to the link interfaces as follows:

Destination Address Range	Link Interface
11100000 00000000 00000000 00000000 through 11100000 00111111 11111111 11111111	0
11100000 01000000 00000000 00000000 through 11100000 01000000 11111111 11111111	1
11100000 01000001 00000000 00000000 through 11100001 01111111 11111111 11111111	2
otherwise	3

a. Provide a forwarding table that has five entries, uses longest prefix matching, and forwards packets to the correct link interfaces.

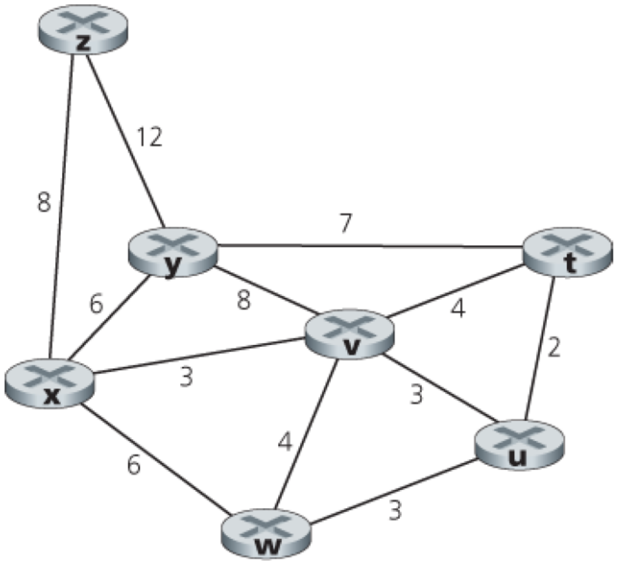
b. Describe how your forwarding table determines the appropriate link interface for datagrams with destination addresses:

11001000 10010001 01010001 01010101

11100001 01000000 11000011 00111100

11100001 10000000 00010001 01110111

(Q3) [20 points]

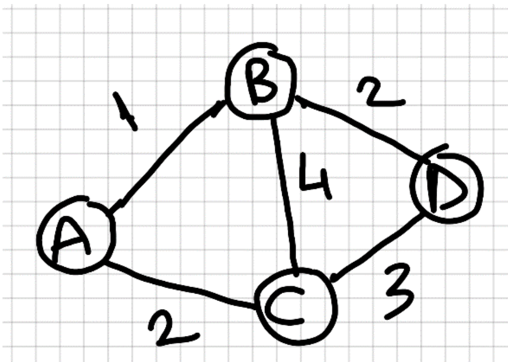


Consider the network shown in Problem P3. Using Dijkstra's algorithm, and showing your work using a table similar to **Table 5.1** , do the following:

a. Compute the shortest path from *x* to all network nodes.
b. Compute the shortest path from *u* to all network nodes.
c. Compute the shortest path from *v* to all network nodes.

(Q4) [20 points]

Consider the network shown below and assume that all link costs in the network have strictly positive integer values.

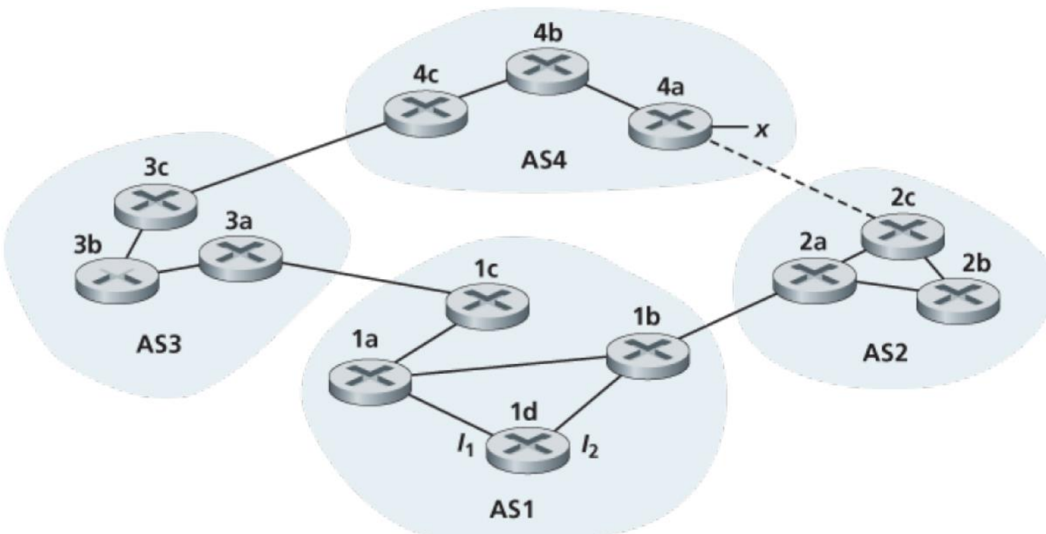


Use distance vector routing algorithm and show distance tables for each node. Note that, there are 4 nodes, so you need to iterate the process n-1 times, in this case 3 times.

(Q5) [15 points]

Consider the network shown below. Suppose AS3 and AS2 are running OSPF for their intra-AS routing protocol. Suppose AS1 and AS4 are running RIP for their intra-AS routing protocol. Suppose eBGP and iBGP are used for the inter-AS routing protocol. Initially suppose there is *no* physical link between AS2 and AS4.

a. Router 3c learns about prefix *x* from which routing protocol: OSPF, RIP, eBGP, or iBGP?
b. Router 3a learns about *x* from which routing protocol?
c. Router 1c learns about *x* from which routing protocol?
d. Router 1d learns about *x* from which routing protocol?



(Q6) [15 points]

A large number of consecutive IP addresses are available starting at 198.16.0.0. Suppose that four organizations, A, B, C, and D, request 4096, 2048, 4096, and 8192 addresses, respectively, and in that order. For each of these, give the first IP address assigned, the last IP address assigned, and the mask in the w.x.y.z/s notation.