# CS 335 Winter 2020 Computer Networks
**Assignment Four** (Due on November 6, 2020)

NOTE: *All assignments are to be submitted to UR Courses. Please note that the due time of each assignment is at 10:00 pm (UR Course time) on the due date. Please make sure to "save the changes" after uploading your files. You must delete the uploaded file if you want to upload a new version. All uploaded files will be submitted automatically after the deadline and your update time is your submission time. You will be unable to change your files after deadline.*

You may see partial markings from UR Courses before the completion of marking. Please do not contact the instructor or marker at that time. I will send a mass email after we complete the marking. You should inform me any errors or inconsistencies within a week of the announcement. Any request made more than one week after the announcing date will not be considered.

1. Read Chapters 4-5. *(0 point)*

2. (*5 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 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?
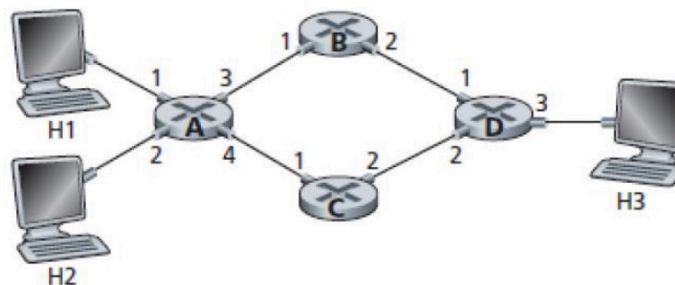
3. (*15 points*) Consider the network setup in Figure 4.25 (see below). Suppose that the ISP instead assigns the router the address 24.34.112.235 and that the network address of the home network is 192.168.1/24.
   a. Assign addresses to all interfaces in the home network.
   b. Suppose each host has two ongoing TCP connections, all to port 80 at host 128.119.40.86, Provide the six corresponding entries in the NAT translation table.
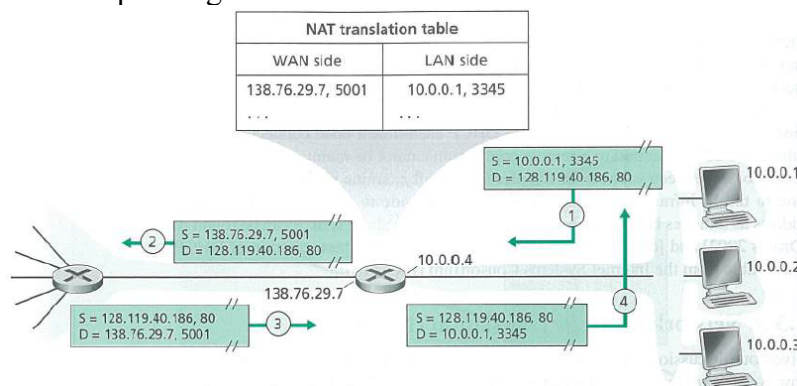
4. (*15 points*) Consider a datagram network using 32-bit host addresses. Suppose a router has four links, numbered 0 through 3, and packets are to be forwarded to the link interfaces as follows:

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

5. (*15 points*) Consider a router that interconnects three subnets: Subnet 1, Subnet 2, and Subnet 3. Suppose all of the interfaces in each of these three subnets are required to have the prefix 223.1.17/24. Also suppose that Subnet 1 is required to support at least 60 interfaces, Subnet 2 is to support at least 90 interfaces, and Subnet 3 is to support at least 12 interfaces. Provide three network addresses (of the form a.b.c.d/x) that satisfy these constraints

6. (*15 points*) Consider the following network. With the indicated link costs, use Dijkstra's shortest-path algorithm to compute the shortest path from x to all network nodes. Show how the algorithm works by computing a table similar to Table 5.1 (Table 4.3 in 6th edition).
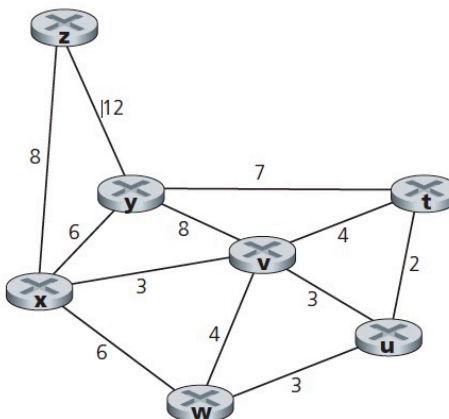
7. *(10 points)* Consider the network shown below. Suppose AS3 and AS2 are running OSPF for their intra-AS routing protocol. Suppose AS1 and AS4 are running RIP for their intra-AS routing protocol. Suppose eBGP and iBGP are used for the inter-AS routing protocol. Initially suppose there is no physical 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?
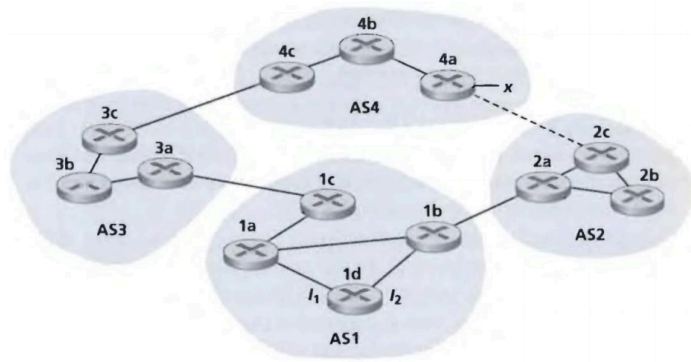
8. Create some review questions in the format of multiple choice, true or false, concept matching, filling blanks, etc. that are suitable for quizzes. (*option, bonus up to 5 points*)

9. Practise with Wireshark labs (0 point)