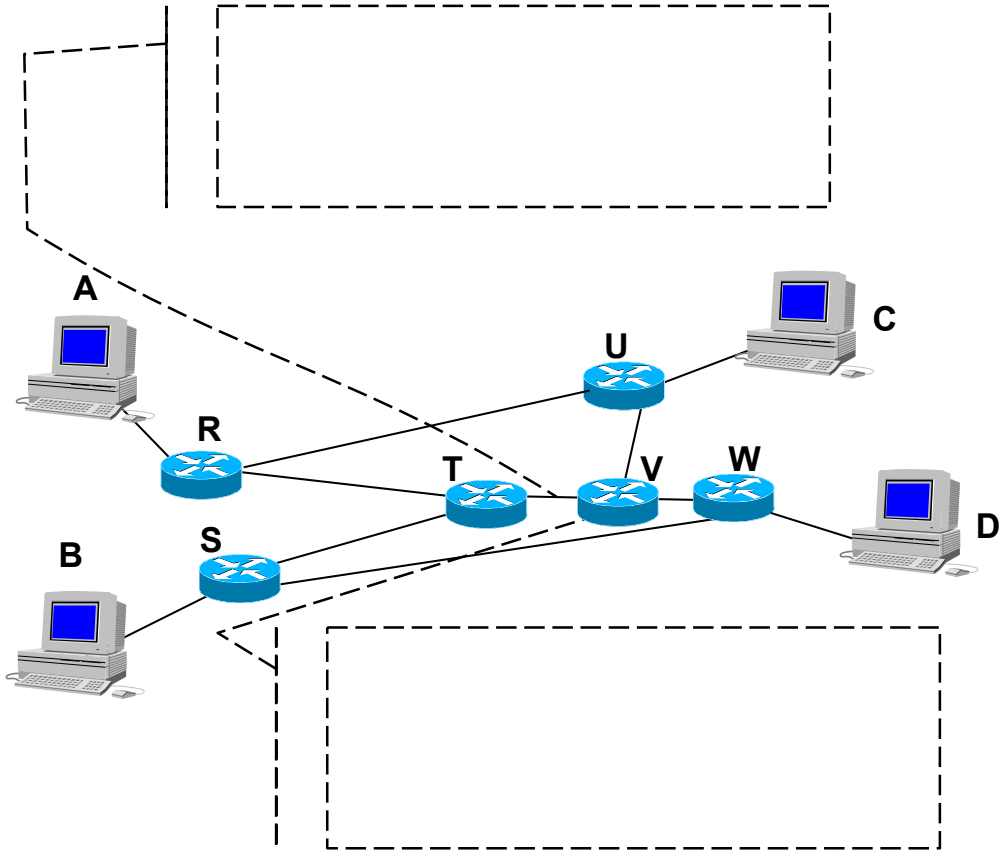
Computer Networks Technologies and Services	September 18th, 2019
First and last name	Student ID .....

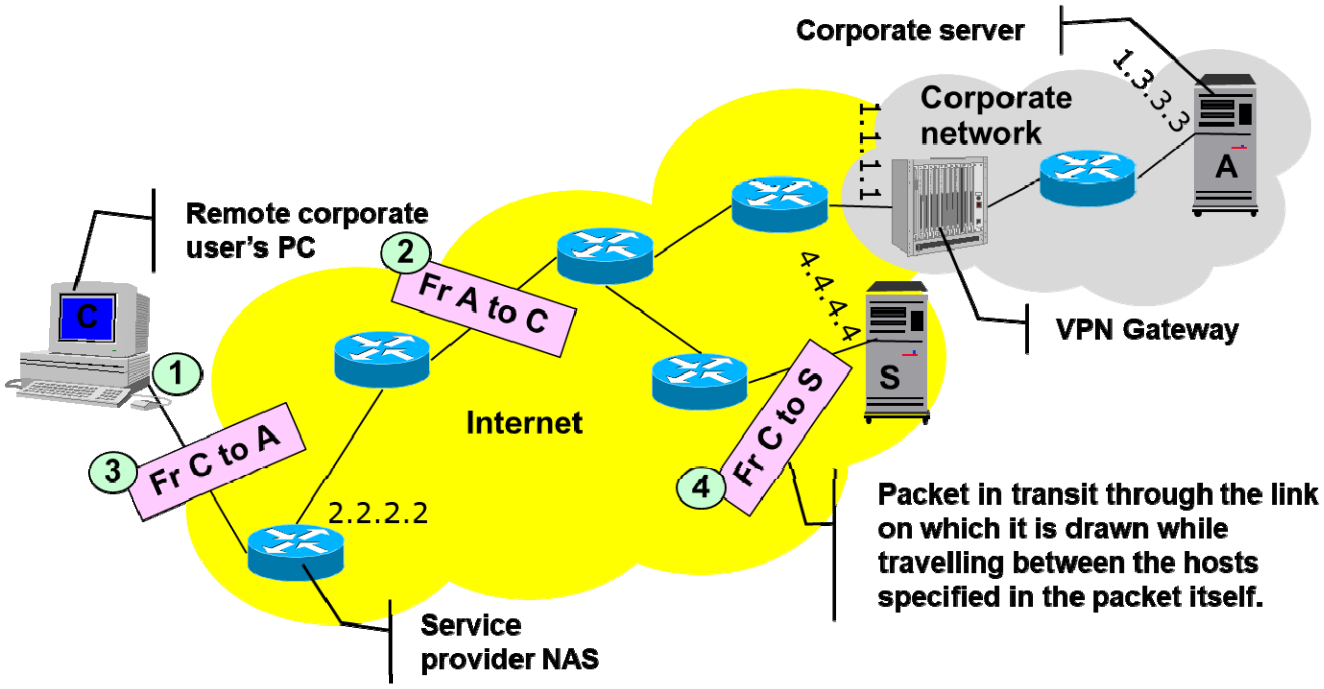
NOTES

i. Nothing else than what is needed to write (pen, eraser), a piece of ID, and possibly water and food can be taken to the seat where you take your exam. Please leave any other item you might have (coat, bag, phone, calculator, and any other object) at the front or back of the classroom.
ii. The answers to each question must be written exclusively on the same page of the question, which is the only material that will be graded.
iii. Do not forget to write your name and student ID in each one of the marked spaces on the exam paper.
iv. In case you will use part of pages containing the questions as a scratch pad, please indicate it clearly and possibly cross out such parts before handing in the exam.
v. The score assigned to answers varies from zero to the maximum score reported at the end of the question. Please notice that the maximum scores of all questions do not necessarily sum up to 30.
vi. When answering questions, please feel free to use drawings whenever they can help expressing and clarifying the answer.
vii. Answers that are not understandable (for example because written badly or with bad handwriting) might be considered wrong.
viii. During the test, any communication with other classmates is prohibited and will cause the student to be sent away from the classroom
ix. The instructors and the assistants that are present during the test are there for the sole purpose of verifying proper progress of the exam. Their role is not giving any support to the interpretation of the text, neither helping the students to correctly formulate the answers. Please avoid any such request.

Question 1) In the network depicted below the letter close to each router and host represents its identifier (e.g., address). List, directly in the corresponding dashed box, the routing information sent by V to T (at steady state), and the routing information stored by the control plane of V (excluding the routing table), assuming that all routers in the network in the figure are using a routing protocol based on the distance vector algorithm. (8 points)



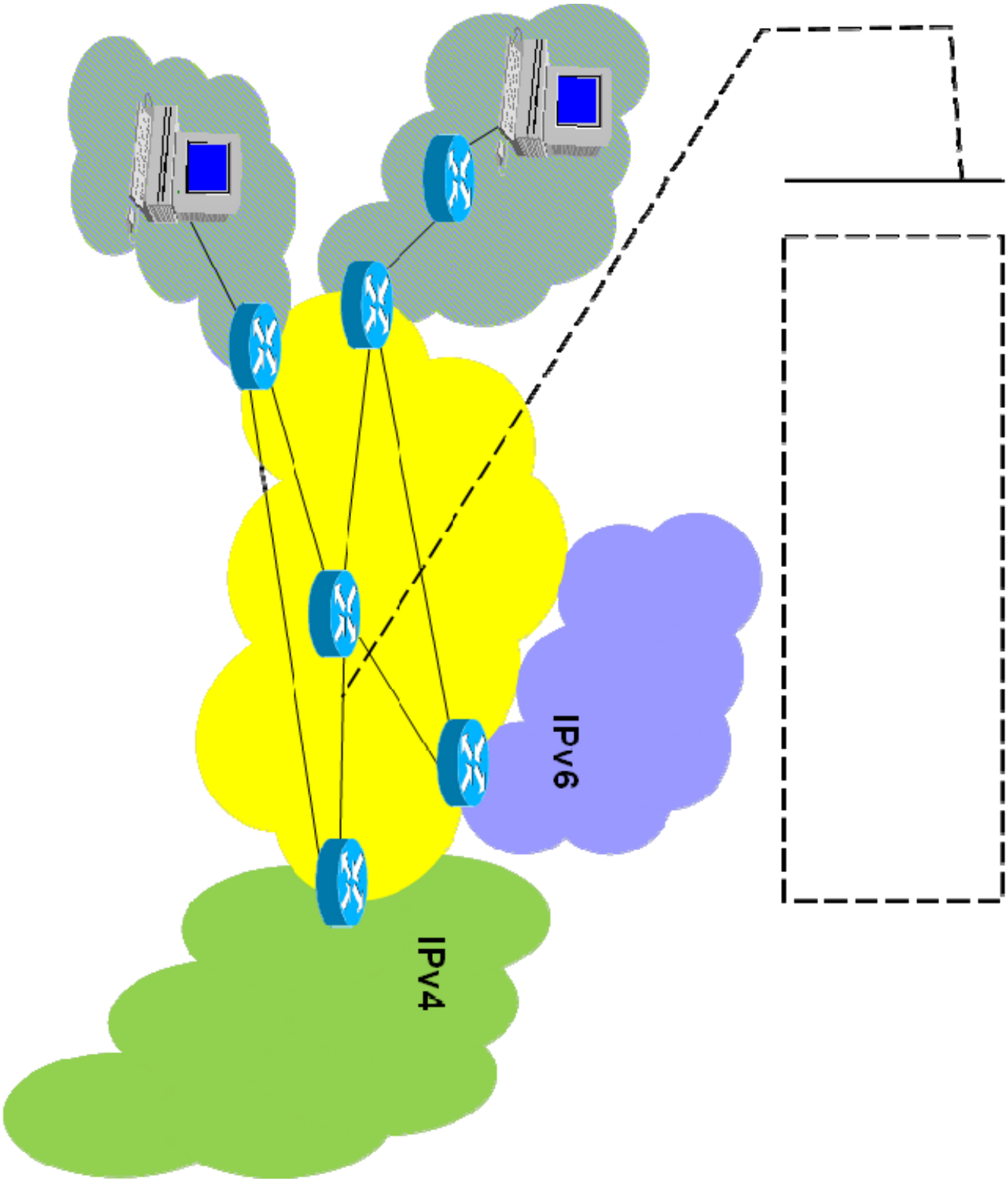
Question 2) Given the customer provisioned access VPN scenario with distributed Internet access depicted in the following figure, indicate (directly in the table below) the IP addresses assigned to interface (1) and included in the packets marked with a number. As far as packets are concerned, please explicitly provide both source and destination IP addresses and, in case multiple IP headers be deployed (tunneling), explicitly list the IP address pair (source and destination) within each of the headers, clearly specifying the header (i.e., internal or external) they belong to. As far the interface is concerned, if the specific VPN deployment scenario requires it to have more than one IP address, please list all of them (assigned coherently with the common deployment practices of this specific access VPN solution). (10 points)



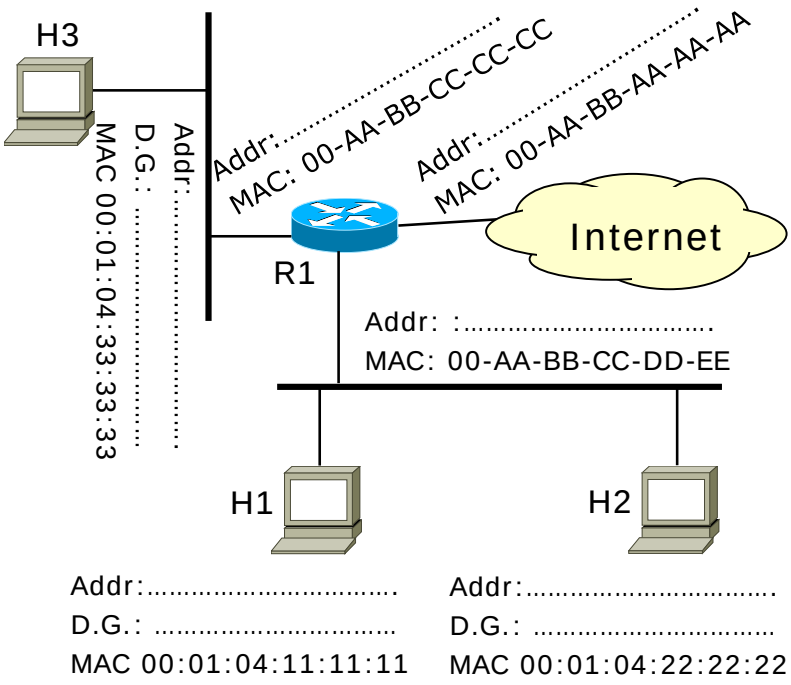
1)
2)
3)
4)

Question 3) Considering that the figure below represents a typical A+P deployment scenario during the transition from IPv4 to IPv6,

1. Annotate (directly on the figure) the (name of the) role played by devices and/or functionality offered (beyond regular IP packet forwarding) and their parameters that are key for the A+P solution to actually work. (4 points)
2. Write in the dashed box information carried by the various headers of a packet transiting on the link indicated in the figure and instrumental to the proper operation of the solution. Indicate, directly on the figure, close to the corresponding interface, any address that appears in such headers (8 points)



Question 4) After filling out the blanks in the picture with the proper IPv6 addresses (that enable all stations to communicate with each other and with Internet servers), write, directly in the table below, relevant information in packets exchanged on the whole network when the user of H1 executes the program `ping` to the address of H3. Use the "Upper layers" cells to specify information related to protocols encapsulated inside IP packets that are relevant in this scenario. Please list at most 6 packets; in case fewer are generated, it is not necessary to use all the rows in the table below. Assume H1 and H3 never sent or received packets before. (10 points)



Pkt. 1	MAC src.	MAC dest.
	IP src.	IP dest.
	Upper layers	
Pkt. 2	MAC src.	MAC dest.
	IP src.	IP dest.
	Upper layers	
Pkt. 3	MAC src.	MAC dest.
	IP src.	IP dest.
	Upper layers	
Pkt. 4	MAC src.	MAC dest.
	IP src.	IP dest.
	Upper layers	
Pkt. 5	MAC src.	MAC dest.
	IP src.	IP dest.
	Upper layers	
Pkt. 6	MAC src.	MAC dest.
	IP src.	IP dest.
	Upper layers	