CSC 458/2209 (Section L5101): Computer Networks, Fall 2025

Department of Computer Science, University of Toronto

Quiz # 1 – 15 minutes	**Date:** Tuesday, October 7th, 2025
Name:	**Student ID #:**

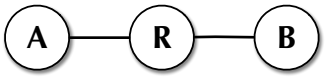
Instructions:

(i) This quiz has 3 problems (9 parts), and a total of 18 points.

(ii) Please be clear and concise in your answers. Explain your reasoning if needed. If the final answer is wrong, but your reasoning is correct you are going to receive partial credit.

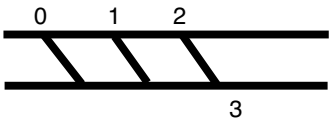
1. Latency. Consider two end-hosts **A** and **B** connected through router **R** as depicted in the figure. The **transmission rates** and **one-way latencies** (propagation delays) are as follows:

- **A** to **R**: 1000 bytes per second with 1 second latency;
- **R** to **B**: 500 bytes per second with 2 second latency.

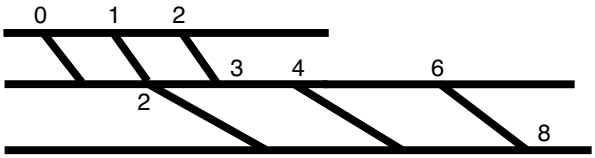


Here, we assume each router uses **store-and-forward** (meaning the router receives the whole packet before forwarding) and there are **no queuing delays** (no extra waiting time in buffers).

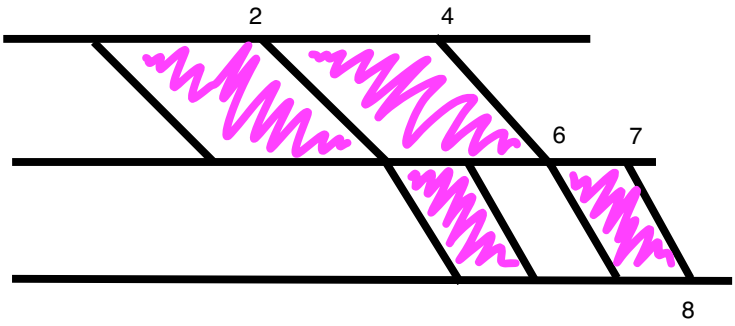
1a) [2 points]. **A** has two packets to transmit to **B**. Each packet (including all headers) is 1000 bytes. If we start transmission at time 0, when will router **R** receive both of these packets completely?



1b) [2 points] When will **B** receive both packets?

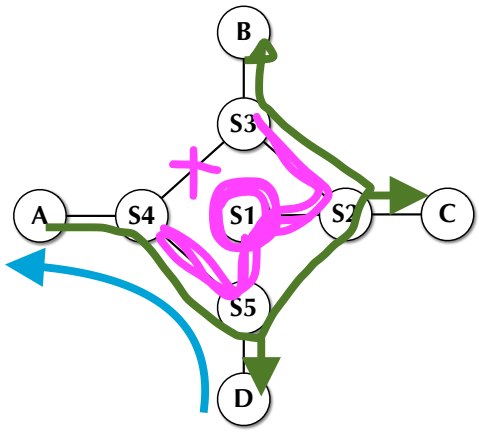


1c) [2 points] Now, let us assume **B** sends two packets of 1000 bytes (including headers) to **A** starting at time 0. When will router **A** receive both of these packets?



Name:

2. Learning Switches. Consider four hosts **A**, **B**, **C**, and **D** connected by a network of switches named **S1** to **S5** as shown in the figure. Here, the IDs of switches **S1** to **S5** are **1** to **5**, respectively. All links have equal cost (cost = 1). We run the spanning tree protocol in this network to make sure there are no loops in the network.



2a) [2 points] Which switch is the root? Which link(s) is/are discarded?

2b) [2 points] Host **A** sends a single packet to host **B**. Which switches this packet goes through to reach its destination (list all the switches along the path).

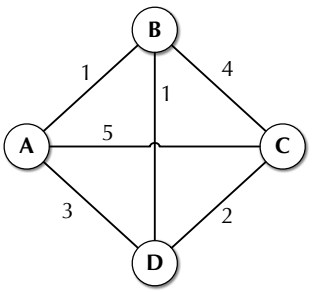
S4 - S5 - S1 - S2 - S3

2c) [2 points] We assume all forwarding tables are initially empty. After Host **A** sends a packet to host **B**, Host **D** sends another packet to Host **A**. Give the forwarding table for switch **S1**.

Destination	**Next Hop**
A	S5

Name:

3. Bellman Ford. In the topology shown in the figure, the links are bidirectional (work in both directions) and the number next to each link shows the cost. Complete the blank parts of the routing tables using the Bellman-Ford algorithm.



3a) [2 points] Step 1**:**

Table for A

Dest	Cost	Next Hop
A	0	A
B	1	B
C	**5**	**C**
D	3	D

Table for B

Dest	Cost	Next Hop
A	1	A
B	0	B
C	**4**	**C**
D	1	D

Table for C

Dest	Cost	Next Hop
A	**5**	**A**
B	**4**	**B**
C	0	C
D	2	D

Table for D

Dest	Cost	Next Hop
A	3	A
B	1	B
C	2	C
D	0	D

3b) [2 points] Step 2**:**

Table for A

Dest	Cost	Next Hop
A	0	A
B	1	B
C	**5**	**C**
D	2	B

Table for B

Dest	Cost	Next Hop
A	1	A
B	0	B
C	**3**	**D**
D	1	D

Table for C

Dest	Cost	Next Hop
A	**5**	**A**
B	**3**	**D**
C	0	C
D	2	D

Table for D

Dest	Cost	Next Hop
A	2	B
B	1	B
C	2	C
D	0	D

3c) [2 points] Step 3**:**

Table for A

Dest	Cost	Next Hop
A	0	A
B	1	B
C	**4**	**B**
D	2	B

Table for B

Dest	Cost	Next Hop
A	1	A
B	0	B
C	**3**	**D**
D	1	D

Table for C

Dest	Cost	Next Hop
A	**4**	**D**
B	**3**	**D**
C	0	C
D	2	D

Table for D

Dest	Cost	Next Hop
A	2	B
B	1	B
C	2	C
D	0	D