

**CS4392/5376: Computer Networks/Communication Networks**  
**Summer II 2021**

**Quiz #1 Solution**

- Full name only: \_\_\_\_\_
- Release date: July 7th, 2021 (Wednesday)
- Due date: **July 9th, 2021 (Friday) before midnight, 11:59 PM**
- Total 5 points

1. [True/False] A reliable network protocol guarantees data delivery from source to destination.

[1 pt]

- False

2. What is the definition of the process?

[1 pt]

- Execution in program or activity

3. Suppose there is exactly one packet switch between a sending host and a receiving host. The transmission rates between the sending host and the switch and between the switch and the receiving host are  $R_1$  and  $R_2$ , respectively. Assuming that the switch uses store-and-forward packet switching, what is the total end-to-end delay to send a packet of length  $L$ ? (Ignore queuing, propagation delay, and processing delay.)

[1 pt]

- $L/R_1 + L/R_2$

4. Suppose Host A wants to send a large file to Host B. The path from Host A to Host B has three links, of rates  $R_1 = 500$  kbps,  $R_2 = 2$  Mbps, and  $R_3 = 1$  Mbps. Assuming no other traffic in the network, what is the throughput for the file transfer?

[1 pt]

- 500 kbps

5. Suppose  $N$  packets arrive simultaneously to a link at which no packets are currently being transmitted or queued. Each packet is of length  $L$  and the link has transmission rate  $R$ . What is the average queuing delay for the  $N$  packets?

[1 pt]

- The queuing delay is 0 for the first transmitted packet,  $L/R$  for the second transmitted packet, and generally,  $(n-1)L/R$  for the  $n$ th transmitted packet. Thus, the average delay for the  $N$  packets is:  
$$\begin{aligned} & (L/R + 2L/R + \dots + (N-1)L/R)/N \\ &= L/(RN) * (1 + 2 + \dots + (N-1)) \\ &= L/(RN) * N(N-1)/2 \\ &= LN(N-1)/(2RN) \\ &= (N-1)L/(2R) \end{aligned}$$
  
Note that here we used the well-known fact:  
 $1 + 2 + \dots + N = N(N+1)/2$