Homework 3: TCP Sliding Window

Due: Wednesday, November 8 @ 11:59 pm EDT

Overview and instructions

This homework is short—it has only 1 problem, and will be weighted less than other homeworks. You can write your responses in your own document or add annotations to this one.

Note on collaboration

You are welcome (and encouraged!) to collaborate with your peers, but the solutions you write down must be **your own work** (ie, written by you). You are responsible for independently understanding all work that you submit—after discussing a problem as a group, you should ensure that you are able to produce your own answers independently to ensure that you understand the problem. For more information, please see the course Collaboration Policy.

In your submission, we ask that you include a brief *collaboration statement* describing how you collaborated with others on each problem—see the next section for details.

How to submit

You will submit your work in PDF form on Gradesope. Your PDF should conform to the following requirements:

- Please **do not** include any identifying information (name, CS username, Banner ID, etc.) in your PDF, since all homeworks are graded anonymously
- Each problem (where "problem" is one of the Problems 1–4) should start on a separate page. When you submit on Gradescope, you will be asked to mark which pages correspond to which problem
- At the start of each problem, write a brief *collaboration statement* that lists the names and CS usernames of anyone you collaborated with and what ideas you discussed together
- If you consulted any outside resources while answering any question, you should cite them with your answer

1 TCP Sliding window (15 pts)

Suppose A and B create a TCP connection with initial sequence numbers 20000 and and 5000, respectively, and an initial window of 8000 bytes. The table below depicts the flow of the connection, which has 3 main events:

1. A sends three 100-byte segments, (Which we will name DataA1, DataA2, and DataA3), and B sends ACKs for each.
2. Between segments DataA2 and DataA3, the application on B calls `read()` on the socket associated with this connection, which returns 200 bytes.
3. B sends a 100-byte segment DataB1 to A and begins the connection termination process with a FIN.

In the table, fill in the SEQ, ACK, and WIN fields for each packet shown, given the initial sequence numbers and window sizes.

Hint: Try to create a similar connection flow using the TCP reference, while looking at the packets sent in Wireshark—this should allow you to view the changes in sequence numbers, and window sizes. Another reference that may be useful is Section 17.3 of the Dordal textbook[1].

t	**Packets sent by A**	**Packets sent by B**
0	SYN, seq=20000, win=8000	
1		SYN,ACK, seq=5000, ack=**20001**, win=8000
2	ACK, seq=**20001**, ack=**5001**, win=8000	
3	ACK, seq=**20001**, ack=**5001**, win=**8000**, data=DataA1	
4		ACK, seq=**5001**, ack=**20101**, win=**7900**
5	ACK, seq=**20101**, ack=**5001**, win=**8000**, data=DataA2	
6		ACK, seq=**5001**, ack=**20201**, win=**7800**
7		[*B calls `read()`, which returns 200 bytes*]
8	ACK, seq=**20201**, ack=**5001**, win=**8000**, data=DataA3	
9		ACK, seq=**5001**, ack=**20301**, win=**7900**
10		ACK, seq=**5001**, ack=**20301**, win=**7900**, data=DataB1
11	ACK, seq=**20301**, ack=**5101**, win=**7900**	
12		FIN,ACK, seq=**5101**, ack=**20301**, win=**7900**
13	. . .	

Grading rubric:

- +3pts: Handshake sequence numbers increment correctly
- +3pts: Sequence numbers correct during data transmission
- +3pts: ACK numbers correct during data transmission
- +3pts: Window size decrease before `read()`
- +3pts: Window size updates appropriately after `read()`

For each item: 3/3 if values are correct, 2/3 for a minor issue, 1/3 for multiple issues, 0/3 if major conceptual problem or answer missing.

Note: Since the fields for each packet depend on each other, if a student makes a mistake on one value, continue grading as if their answer were correct—ie, students should not be penalized multiple times for the same mistake.