Week 12 Questions

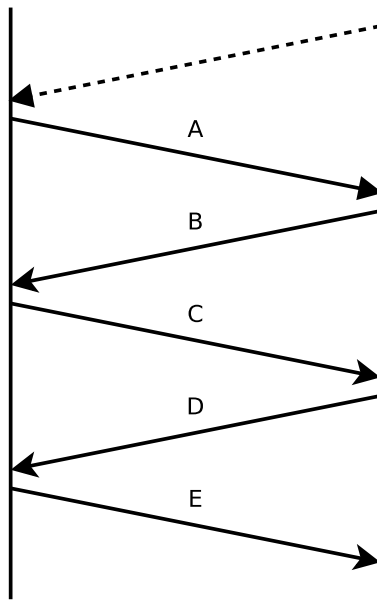## Prof. Kredo

1. (a) TCP flow control uses the
   A. advertised/receiver's window.
   B. router's window.
   C. congestion window.

   (b) TCP assumes the majority of packet losses come from
   A. a slow destination device.
   B. buffer overflow in network devices.
   C. hardware faults in network devices.
   D. errors introduced when sending packets.

   (c) Which of the following are functions provided by TCP as part of reliability?
   ◯ in order
   ◯ no duplicates
   ◯ within timeout
   ◯ no losses
   ◯ no eavesdropping

2. Complete the table below to indicate how TCP transfers data. For each transmission, the table should indicate:

- Flags set (ACK, SYN, and FIN only)
- Sequence Number
- ACK Number (if unknown mark as X)

The diagram and table do not contain all the packets for the TCP connection. Assume no packet losses have occurred.

Packet	Data Bytes	Flags (SYN/FIN/ACK)	Sequence Number	ACK Number
A	300	ACK	4500	300
B	200	ACK	300	4800
C	0	FIN, ACK	4800	500
D	0	FIN, ACK	500	4801
E	0	ACK	4801	501

3. Your friend says that ACK numbers aren't necessary in TCP, but you disagree. You draw the flow diagram below showing how TCP would behave without ACK numbers. Assume the TCP connection is established before the packets shown in the diagram. Only sequence numbers for packets from A to B and only TCP flags for packets from B to A are shown for clarity.
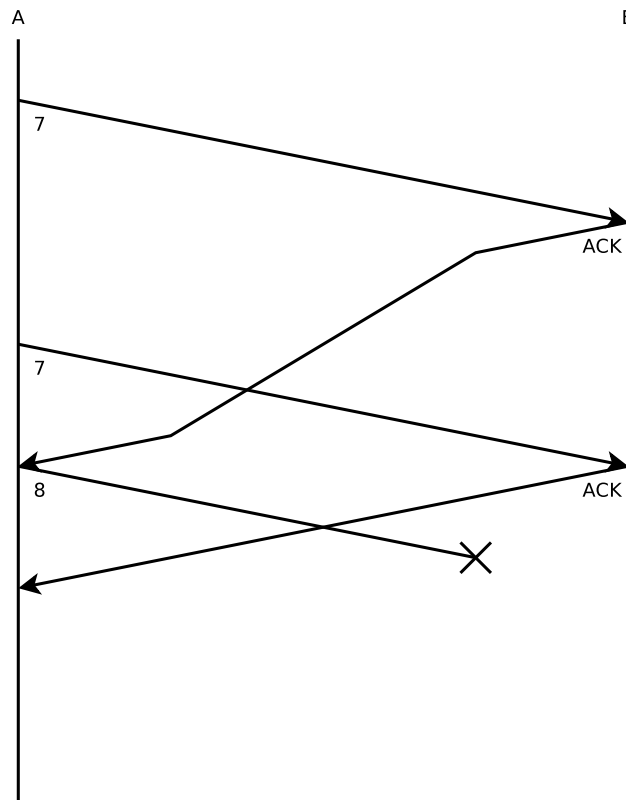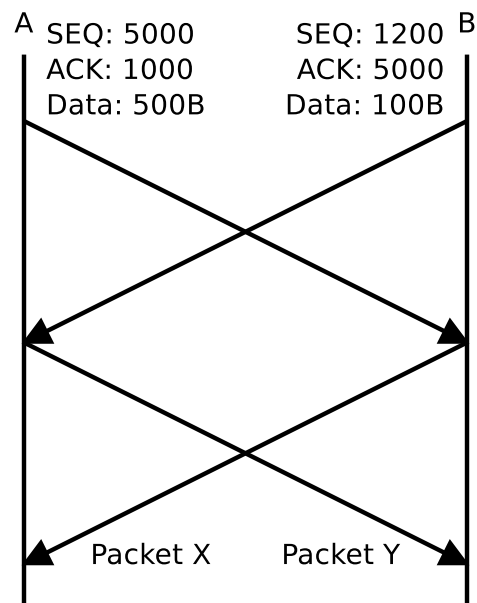

(a) Explain the problem that occurs without ACK numbers based on the diagram.

(b) Explain how ACK numbers fix the problem you described above.

4. Fill in the table below to indicate the sequence and ACK numbers and important TCP header flags for the packets exchanged between A and B. The table includes all packets exchanged between A and B. No packet losses occur.

Direction	Data Size (B)	SYN	FIN	ACK	SEQ Number	ACK Number
$A \rightarrow B$	0				100	
$A \leftarrow B$	0				500	
$A \rightarrow B$	0					
$A \rightarrow B$	10					
$A \leftarrow B$	30					
$A \rightarrow B$	0					
$A \leftarrow B$	30					
$A \rightarrow B$	0					
$A \leftarrow B$	0					
$A \rightarrow B$	0					

5. The diagram below shows packets from a TCP stream. Fill in the values for the sequence and ACK numbers for the two packets labeled X and Y. Assume that the packets which arrive at each device are new and not retransmissions and that each device has data ready to send in the window.

```
A  SEQ: 5000          SEQ: 1200 B
   ACK: 1000          ACK: 5000
   Data: 500B         Data: 100B




         Packet X     Packet Y
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Packet	SEQ Number	ACK Number
X		
Y		

6. (From P&D 5*th* Edition, Chapter 5 Problem 6) A sender on a TCP connection that receives a 0 advertised window periodically probes the receiver to discover when the window becomes nonzero. Why would the receiver need an extra timer if it were responsible for reporting that its advertised window had become nonzero (i.e., if the sender did not probe)?

7. (From P&D 5*th* Edition, Chapter 5 Problem 16) Suppose an idle TCP connection exists between sockets A and B. A third party has eavesdropped and knows the current sequence number at both ends.

   (a) Suppose the third party sends A a forged packet ostensibly from B and with 100 bytes of new data. What happens? (Hint: Look up in RFC 793 what TCP does when it receives an ACK that is not an "acceptable ACK.")

   (b) Suppose the third party sends each end such a forged 100-byte data packet ostensibly from the other end. What happens now? What would happen if A later sent 200 bytes of data to B?