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10/28/19

CSE 3300

Homework 2

1) Here is the transcript for the following scenario (C: = client commands, S: = server responses, user: = declare username, pass: = password, list: = list message numbers, retr: retrieve message by number):

S: +OK POP3 server ready

C: user <username>

S: +OK

C: pass <password>

S: +OK user successfully logged on

C: list

S: 1 498 (message number of details of the message)

S: 2 560 (message number of details of the message)

S: 3 912 (message number of details of the message)

S: .

C: retr 1

S: <contents of message 1>

S: .

C: retr 2

S: <contents of message 2>

S: .

C: retr 3

S: <contents of message 3>

S: .

C: quit

S: +OK POP3 server signing off

2) The protocol would still work as intended. If no ACK is sent back to the sender it will retransmit the packer, and if no packet is received by the receiver it will retransmit an ACK. The retransmission would be what happens if the packets with errors was lost, and the receiver is never aware of these events. If each packet and ACK is essentially copied because of not getting a packet or ACK, the number of times a packet would be sent would be n as n approaches infinity, hence a possible infinite loop of packet and ACK transmissions. The protocol still functions, but will have an infinite loop, so premature timeouts could solve this issue.

3) A) 01011100 + 01100101 = 11000001

   1's complement = 00111110

   B) 11011010 + 01100101 = 100111111, wraparound exists, so corrected is 01000000

   1's complement = 10111111

   C) Change the leftmost bit of both bytes to 1: 11011100 + 11100101 = 11000001

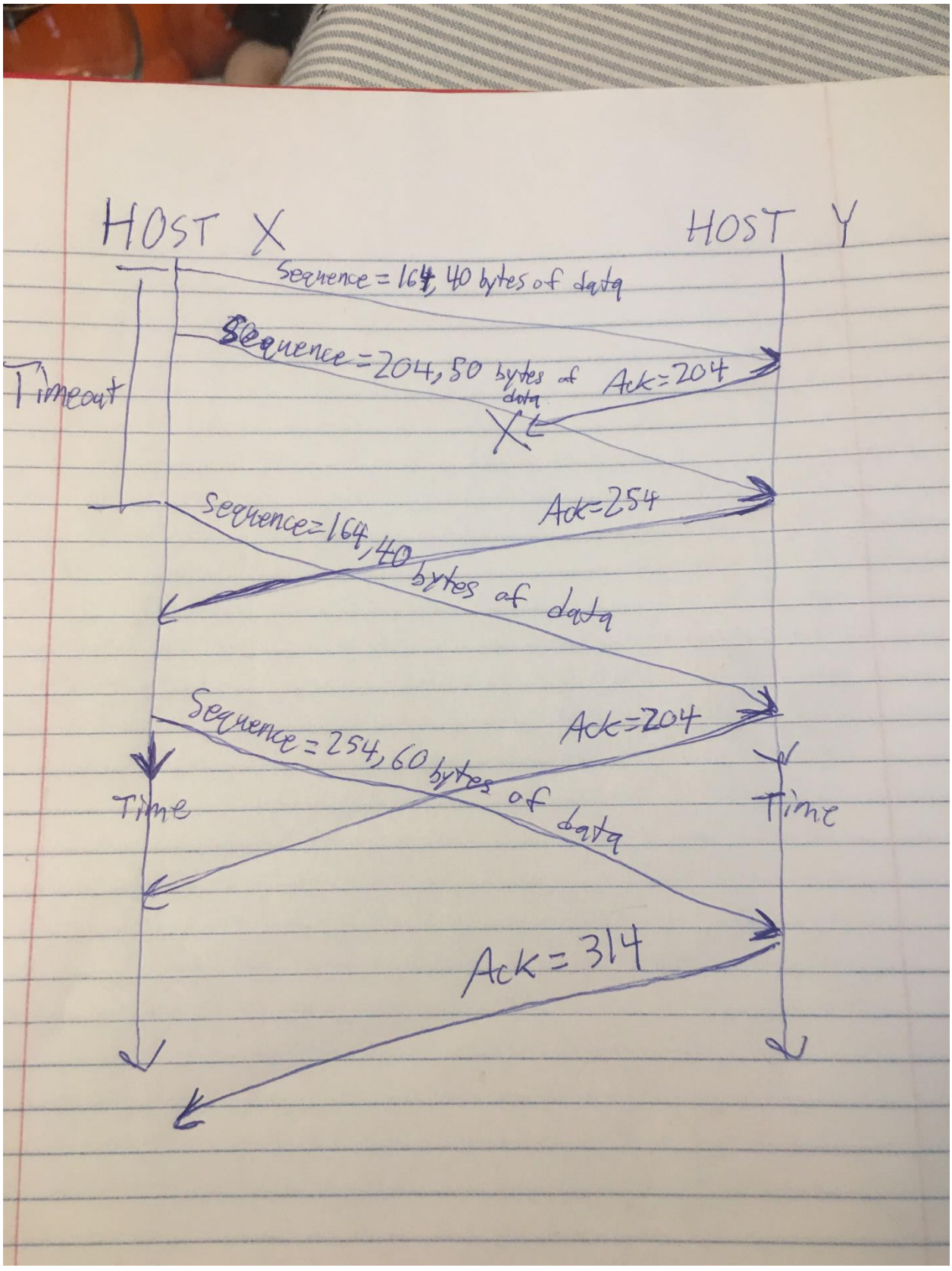
   1's complement = 00111110, which is the same in part (a).

4) A) The sequence number would be the sequence of the first segment plus the data sent in each segment prior to the third segment, so 40 + 50 = 90 bytes. 164 + 90 = 254 is the sequence number. The source port number is 105 and the destination port number is 80.

   B) The acknowledgement number would be the sequence number of the first segment plus the data in the first segment, so 164 + 40 = 204 is the acknowledgement number. The source port number would be 80 and the destination port number would be 105.

   C) The acknowledgement number would ignore the data of the first segment if the second segment is sent first, so the sequence number would be acknowledgement number: 164. This means it is still awaiting the arrival of 164 bytes.

   D)


HOST X
HOST Y
Sequence = 164, 40 bytes of data
Sequence = 204, 50 bytes of data
Ack = 204
Timeout
Sequence = 164, 40 bytes of data
Ack = 254
Sequence = 254, 60 bytes of data
Ack = 204
Time
Time
Ack = 314

5) A) TCP slow start is occurring through transmission rounds1-6 and 23-26.

B) TCP congestion avoidance is operating between transmission rounds 6-16 and 17-22.

C) For a timeout to occur, the congestions window size would be 1. In this case, it did not drop down to 1. Thus, the packet loss is due to a triple duplicate ACK.

D) Looking again at the congestion window size, in this case it is 1. This means that a triple duplicate ACK could not have caused the packet loss. Thus, the packet loss is due to a timeout.

E) The first transmission ssthresh is the window size where slow start stops, and congestions avoidance begins. Looking at the graph, this happens at transmission round 6 and 32 congestions window size. Thus, the stthresh is initially 32.

F) When a case of packet lose is detected, the stthresh becomes half the size of the previous congestion window size. Just before the packet loss the window size was 42, thus the stthresh of the 18^{th} round is 21.

G) Same as the previous question, the stthresh will be half the size of the congestion window size when encountering a packet loss. Thus, the congestion window size was 29 before the packet loss, thus the stthresh is roughly 14.5.