Online Exam #3, Problem #12

Suppose two TCP stations (a sender and a receiver) have established a connection between them successfully. Suppose that (i) the sender runs the TCP New Reno congestion control scheme and, initially, *cwnd = 1 data segment* and *ssthresh = 4 data segments*; (ii) the receiver has informed the sender that *rwnd = 10 data segments*; (iii) data segments #15 and #16 are lost on the first attempt, while all other transmissions (including re-transmitted data segments and ACK frames) are successful. The sender behavior at time 4*RTT (Round-Trip Time) is shown in the table below. Complete the rest of the table for the sender behavior at 5*RTT, 6*RTT, 7*RTT, and 8*RTT.

Time	Packet Received	Action Taken	List of unACKs packets	Total # dup ACKs	Estimated # outstanding packets	ssthresh value	cwnd size	cwnd range	# **new** packets to send
4 RTT	A9		9,10,11,12			4	5+1/5	9,10,11,12,13	1: #13
	A10		10,11,12,13			4	5+2/5	10,11,12,13,14	1: #14
	A11		11,12,13,14			4	5+3/5	11,12,13,14,15	1: #15
	A12		12,13,14,15			4	5+4/5	12,13,14,15,16	1: #16
	A13		13,14,15,16			4	6	13,14,15,16,17,18	2: #17, #18
5 RTT									
6 RTT									
7 RTT									
8 RTT									