- 1)
- a) Identify the time intervals when TCP Slow Start is operating. [1-6) and [23 26)
- b) Identify the time intervals when TCP Congestion Avoidance is operating. [6-22]
- c) What is the value of ssthresh at the 4th transmission round? Ssthresh = 32 as that is the cwnd that SS stops and CA starts
- d) What is the value of ssthresh at the 10th transmission round?

  No dup acks or timeouts have occurred so ssthresh = 32 still
- e) What is the value of ssthresh at the 20th transmission round? Had dup ack so ssthresh = cwnd/2 = 42/2 = 21
- f) What is the value of ssthresh at the 24th transmission round? Had timeout so ssthresh = cwnd/2 = 26/2 = 13
- g) After the 16th transmission round, is the segment loss detected by a 3rd duplicate ACK or by a timeout?

Is a 3<sup>rd</sup> dup ack as cwnd isn't set to 1, rather cut in half.

h) Assuming a segment loss is detected after the 26th round by a timeout, what will be the values of new congestion window size and ssthresh?

Cwnd = 1 and sshthresh = cwnd/2 = 4

	Packet	Action	List of	Total #	Estimated #	ssthresh	cwnd	cwnd	# new packets	Notes
Time	Received		unACKs	dup ACKs	outstanding	value	size	range	to send	
			packets		packets					
3 RTT	A5		5,6,7			4	4+1/4		1: #8	
	A6		6,7,8			4	4+2/4	6 - 9	1: #9	
	A7		7,8,9			4	4+3/4	7 -10	1: #10	
	A8		8,9,10			4	5	8 -12	2: #11, #12	Lost #12
4 RTT	A9		9,10,11,12			4	5+1/5	9 -13	1: #13	
	A10		10,11,12,13			4	5+2/5	10 - 14	1: #14	Lost #14
	A11		11,12,13,14			4	5+3/5	11 - 15	1: #15	
	A12		12,13,14,15			4	5+4/5	12 -16	1: #16	
5 RTT	Dup A12			1						From #13
	Dup A12			2						From #15
	Dup A12	Enter FR	12,13,14,15,16	3	5 - 3 = 2	2	2	12 - 13	None	From #16
6 RTT	A14		14, 15, 16	0	3	2	2	14 - 15	None	
7 RTT	A17	Exit FR	None	0	0	2	2+1/2	17-18	#2: 17, 18	