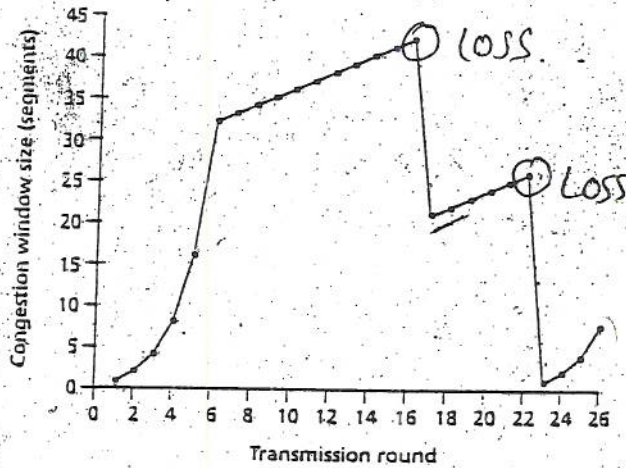
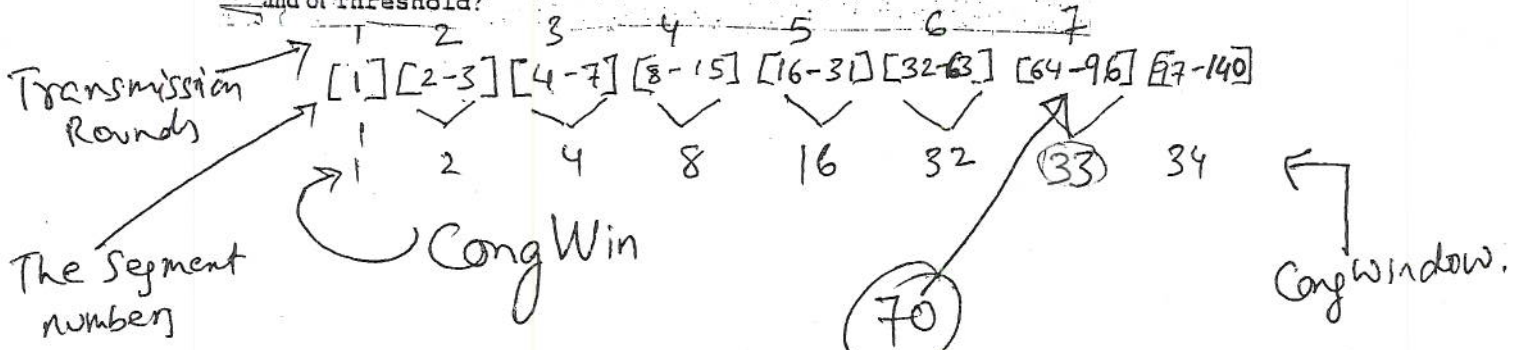


Consider the following plot of TCP window size as a function of time.



Assuming TCP Reno is the protocol experiencing the behavior shown above, answer the following questions. In all cases, you should provide a short discussion justifying your answer.

- Identify the intervals of time when TCP slow start is operating.  $[1-6]$   $[23-26]$
- Identify the intervals of time when TCP congestion avoidance is operating.  $[6-16]$ ,  $[17, 22]$
- After the 16<sup>th</sup> transmission round, is segment loss detected by a triple duplicate ACK or by a timeout?   
Triple DUP
- After the 22<sup>nd</sup> transmission round, is segment loss detected by a triple duplicate ACK or by a timeout?   
Timeout
- What is the initial value of Threshold at the first transmission round? 32
- What is the value of Threshold at the 18<sup>th</sup> transmission round?  $\rightarrow \frac{1}{2} \text{ of } 42 = 21$
- What is the value of Threshold at the 24<sup>th</sup> transmission round?  $\rightarrow \frac{1}{2} \text{ of } 26 = 13$
- During what transmission round is the 70<sup>th</sup> segment sent?
- Assuming a packet loss is detected after the 26<sup>th</sup> round by the receipt of a triple duplicate ACK, what will be the values of the congestion-window size and of Threshold?



i) CongWin  $\Rightarrow \frac{1}{2}$  CongWin =  $\frac{1}{2} \times 8 = 4$   
 Th =  $\frac{1}{2}$  CongWin =  $\frac{1}{2} \times 8 = 4$