Homework 8 (Transport Layer)

Answer the following questions in Exercise 8 under "Tests & Quizzes".

Concepts

- Reliable Data Communication
- Sliding Windows protocols
- Round-Trip Time and Retransmission Timeout
- Congestion Control

Sliding Windows and ABP

Answer True or False to the following questions:

Q1.

With the **SR** (Selective Repeat) protocol, it is possible for the sender to receive an ACK for a packet falls outside of its current window.

Q2.

With **GBN** (Go-Back-N) protocol, it is possible for the sender to receive an ACK for a packet that falls outside of its current windows.

Q3.

The **ABP** (Alternating Bit Protocol) is the same as SR protocol with a sender and receiver window size of 1.

Q4.

The **ABP** (Alternating Bit Protocol) is the same as GBN protocol with a sender and receiver window size of 1.

Timeout Estimation

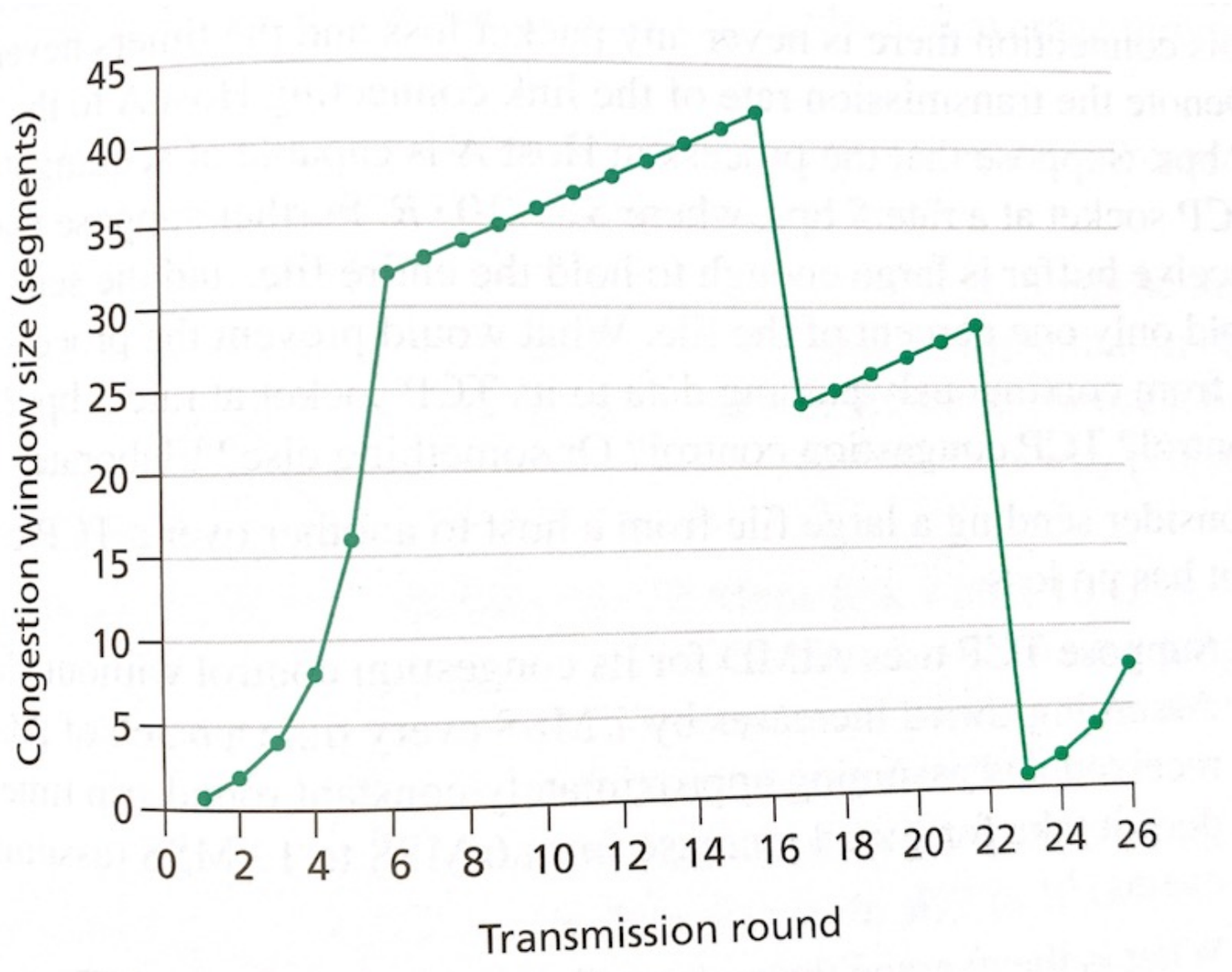
Q5

Suppose that 5 measured `SampleRTT` values are: t_1=106, t_2=120, t_3=140, t_4=90, and t_5=115 ms. Assume the value of `EstimatedRTT` was 100ms and the value of `DevRTT` was 5ms at t_0. Use a value of $\alpha = 0.125\ (1/8)$ and a value of $\beta = 0.25\ (1/4)$, compute the TCP `TimeoutInterval` at time t_1, ..., t_5, **rounded** to the nearest integer milliseconds.

Time	EstimatedRTT	SampledRTT	DevRTT	Error	Timeout
0	100.00		5.00		
1		106			
2		120			
3		140			
4		90			
5		115			

Congestion Control

Assuming TCP (Reno) is the protocol experiencing the congestion control behaviors above. Answer each of the following questions with short justification:



Q6.

identify the intervals of time when TCP **slow start** is operating.

Q7.

identify the intervals of time when TCP **congestion avoidance** is operating.

Q8.

after the 16^{th} transmission round, is the segment loss detected by a **triple duplicated ACKs** or by a **timeout**?

Q9.

after the 22^{th} transmission round, is the segment loss detected by a **triple duplicate ACKs** or by a **timeout**?

Q10.

what is the initial value of `ssthresh` at the 1^{st} transmission round? and at the 18^{th} transmission round?