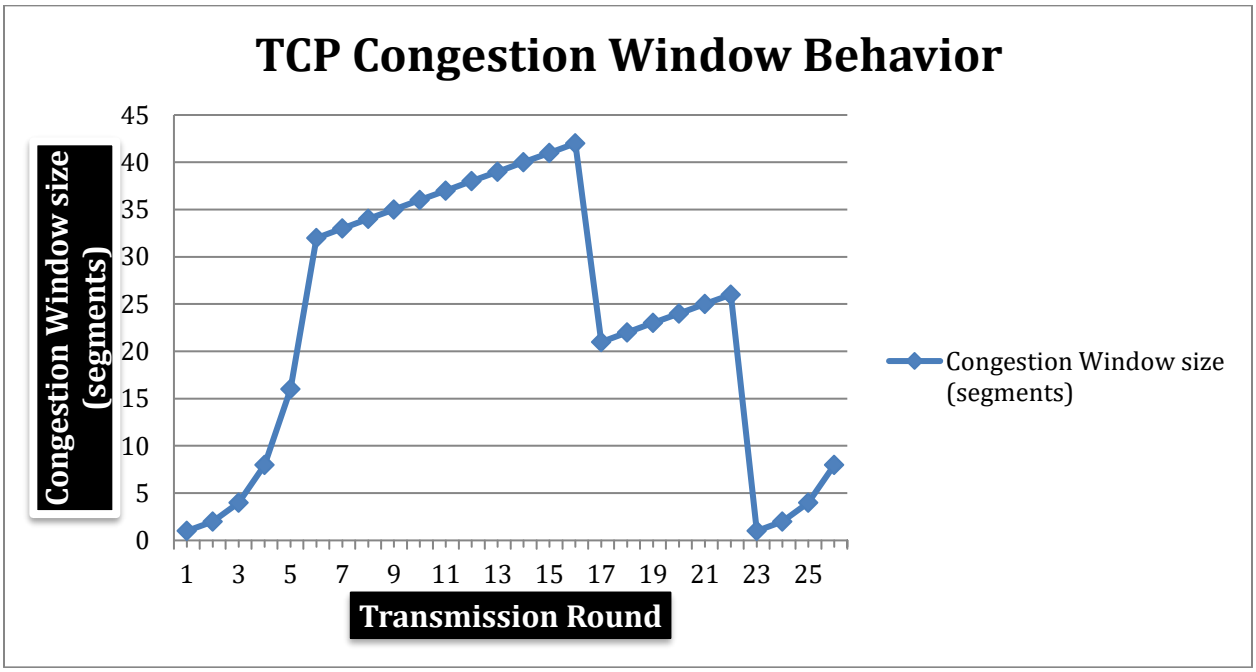
CS 164, Fall 2019

Homework 3

Due: Thursday, November 20th, 2019, 11:59 pm online.

1. Consider the TCP Congestion Window Behavior in Figure below. Assuming TCP Reno is the protocol used. Answer the following questions; in all cases, you should provide a short discussion justifying your answer. (3 points for each answer)



a. Identify the intervals of time when TCP slow start is operating.
b. Identify the intervals of time when TCP congestion avoidance is operating.
c. After the 16th transmission, is segment loss detected by a timeout or by a triple duplicate ACK?
d. After the 22nd transmission, is segment loss detected by a triple duplicate ACK or by a timeout?
e. What is the initial value of **ssthresh** at the first transmission?
f. What is the value of **ssthresh** at the 18th transmission?
g. What is the value of **ssthresh** at the 24th transmission ?
h. Assuming a packet loss is detected after the 26th transmission by the receipt of a triple duplicate ACK, what will be the values of the congestion window size and of **ssthresh?**

2. We are trying to design a pipelined reliable data transfer protocol to fully utilize a cross-country link between a source (US East Coast) and destination (US West Coast). The RTT is 25 milliseconds. The transmission rate R is 1 Gigabit/second. The packet size, L is 1250 bytes including header fields and data. What is the Window size, N, that is to be used by a Selective Repeat protocol to make the utilization of the sender and the link be 100%. (20 points)