# ECE363 Assignment 4

Student ID:

1. Consider transferring an enormous file of L bytes from Host A to Host B. Assume an MSS of 1,460 bytes.

   (a) What is the maximum value of L such that TCP sequence numbers are not exhausted? Recall that the TCP sequence number field has 4 bytes.

   (b) For the L you obtain in (a), find how long it takes to transmit the file. Assume that a total of 66 bytes of transport, network, and data-link header are added to each segment before the resulting packet is sent out over a 10 Mbps link. Ignore flow control and congestion control so A can pump out the segments back to back and continuously.

2. Assuming TCP Reno is the protocol experiencing the behavior shown below. Answer the following questions. Provide a short discussion (be brief) justifying your answer.
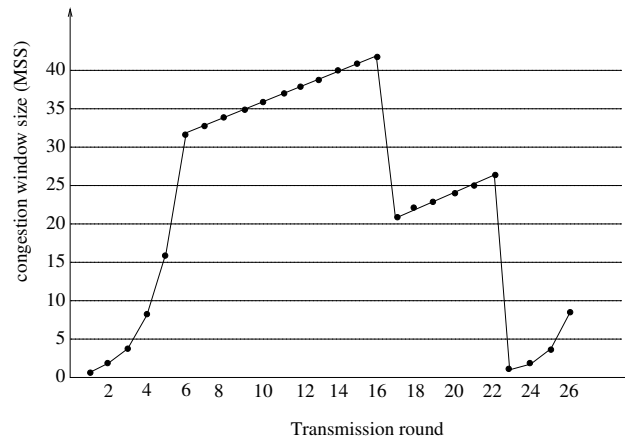
   (a) Identify the intervals of time when TCP slow start is operating.

   (b) Identify the intervals of time when TCP congestion avoidance is operating.

   (c) After the 16th transmission round, is segment loss detected by a triple duplicate ACK or by a timeout?

(d) After the 22nd transmission round, is segment loss detected by a triple duplicate ACK or by a timeout?

(e) What is the initial value of slowstart threshold at the first transmission round?

(f) What is the value of slowstart threshold at the 18th transmission round?

(g) What is the value of slowstart threshold at the 24th transmission round?

(h) During what transmission round is the 70th segment sent?

(i) Assuming a packet loss is detected after the 26th round by the receipt of a triple duplicate ACK, what will be the values of the congestion window size and of the slow start threshold?

3. We note that TCP waits until it has received three duplicate ACKs before performing a fast retransmit. Why do you think the TCP designers chose not to perform a fast retransmit after the first duplicate ACK for a segment is received?

4. Optional question: A TCP sender sends an enormous file over a link between routers A and B, with 10 Mbps. No other traffic share the link with it. Assume that there is no transmission error of the link, and the routers' buffer size is much smaller than the file size. Is it possible that there is no packet lost for the whole file transfer? If so, how?