RAT Test Run

Question 1: During TCP's three-way handshake as discussed in the readings:

A Data can be transmitted in any segment sent by the client.

B Data can only be transmitted in the final ACK sent by the client.

C Data cannot be transmitted in any segment.

D Data can be immediately transmitted in the first SYN segment.

Question 2: What are the main variables used in TCP Congestion & Flow Control at the sender?

A LastByteReceived, CongestionWindow (cwnd), ReceiverWindow (rwnd), LastByteSent.

B LastByteAcked, CongestionWindow (cwnd), ReceiverWindow (rwnd), LastByteSent.

C LastByteReceived, SenderWindow (swnd), ReceiverWindow (rwnd), LastByteSent.

D LastByteAcked, SenderWindow (swnd), ReceiverWindow (rwnd), LastByteSent .

Question 3: Select the correct sentence:

A The amount of unacknowledged data at the sender is limited by the **minimum** value between the **sender window (swnd)** and receiver window (rwnd).

B The amount of unacknowledged data at the sender is limited by the **minimum** value between the **congestion window (cwnd)** and receiver window (rwnd).

C The amount of unacknowledged data at the sender is limited by the **maximum** value between the **sender window** (swnd) and receiver window (rwnd).

D The amount of unacknowledged data at the sender is limited by the **maximum** value between the **congestion window (cwnd)** and receiver window (rwnd).

Question 4: In the slow-start state, TCP:

A does nothing because this state **does not** exist.

B starts with a small window and slowly increases it by a single MSS **per RTT**.

C starts with a small window and increases it **for each ACK segment**.

D starts with a small window and slowly increases it **for each sent segment**.

Question 5: In the **congestion-avoidance** state, TCP:

A does nothing because this state **does not** exist.

B starts with a small window and exponentially increases it **for each ACK segment**.

C starts with a variable window, roughly half its value when congestion was last encountered, and increases it by a single MSS **for each duplicate ACK**.

D starts with a variable window, roughly half its value when congestion was last encountered, and slowly increases it by a single MSS **per RTT**.

Question 6: Select the correct sentence:

A Two **TCP connections** sharing the same link will **always** be crowded out by UDP traffic on that same link.

B Two **applications** using either TCP or UDP sockets and sharing the same bottleneck link will always guarantee a fair link utilisation.

C Two **TCP connections** sharing the same bottleneck link will eventually converge to a fair link utilisation.

D Two **applications** using TCP sockets and sharing the same bottleneck link will always guarantee a fair link utilisation.

Question 7: Explicit Congestion Notification (ECN):

A depends entirely on the transport layer.

B is only managed by the end system (sender and receiver).

C is only available for TCP connections.

D depends not only on the transport layer but also on the network layer.

Question 8: TCP congestion control:

A can be **delay-based** to detect congestion before a loss occurs.

B is **delay-based** regardless of the TCP implementation in question.

C is **loss-based** regardless of the TCP implementation in question.

D can be **loss-based** to detect congestion before a loss occurs.

Question 9: A TCP sender starts in **slow start** with $cwnd = 1, \mathrm{MSS}$. Assume that during the first three RTTs there are no losses and the receiver sends ACKs for all segments normally. What is $cwnd$ (in MSS) **after 3 RTTs**?

A $6, \mathrm{MSS}$

B $16, \mathrm{MSS}$

C $8, \mathrm{MSS}$

D $4, \mathrm{MSS}$

Question 10: A TCP sender has $cwnd = 16, \mathrm{MSS}$ and $ssthresh = 12, \mathrm{MSS}$. A loss is detected by receiving **three duplicate ACKs** (fast retransmit/fast recovery). Which outcome matches the standard loss-based TCP behavior in Kurose/Ross?

A Set $ssthresh = 16, \mathrm{MSS}$ and reduce $cwnd$ to $12, \mathrm{MSS}$.

B Set $ssthresh = 8, \mathrm{MSS}$ and reduce $cwnd$ to about $8, \mathrm{MSS}$ (then continue in congestion avoidance).

C Set $ssthresh = 12, \mathrm{MSS}$ and reset $cwnd$ to $1, \mathrm{MSS}$ (go to slow start).

D Keep $ssthresh$ unchanged and increase $cwnd$ by $1, \mathrm{MSS}$ per ACK (congestion avoidance continues unchanged).