RAT Test Run

Question 1: In TCP, the Sequence Number in a segment refers to:

A The total number of bytes sent so far in the connection.

B The number of bytes currently unacknowledged.

C The byte number of the first data byte carried in this segment (relative to the connection's initial sequence number).

D The byte number of the last data byte carried in this segment.

Question 2: Why does TCP use an exponential weighted moving average for RTT estimation? Why not a simple arithmetic average?

A Because with an **arithmetic average** newer samples would have higher influence and reflect newer changes in the link.

B Because with an **exponential weighted moving average** there would be no difference between older and newer samples.

C Because with an **arithmetic average** older and newer samples would have have the same influence.

D Because with an **exponential weighted moving average** older samples would have higher influence and better reflect the overall history of the link.

Question 3: TCP uses the RTT estimate to compute what value?

A To compute the fast retransmit threshold.

B To compute the sender window.

C To compute the retransmission timeout value.

D To compute the receive window.

Question 4: Imagine you want to download a file with a size of $1000\,\mathrm{MiB}$. Assume a Maximum Segment Size (MSS) of $1024\,\mathrm{B}$, a total of $64\,\mathrm{B}$ of transport, network and data-link header added to each segment, and a constant bandwidth of $65536\,\mathrm{Kbit/s}$. For simplicity, ignore flow and congestion control, i.e., the sender can pump out the segments back to back and continuously. **How long does it take to transmit the file?** (Hints: It's easier to work with powers of 2; $65536 = 2^{16}$; $\mathrm{MiB} \neq \mathrm{Mbit}$)

A It takes $128.125\,\mathrm{s}$ (i.e., $2^{-3} + 2^{7}$).

B It takes $128\,\mathrm{s}$ (i.e., 2^{7}).

C It takes $136\,\mathrm{s}$ (i.e., $2^{3} + 2^{7}$).

D It takes $17\,\mathrm{s}$ (i.e., $2^{0} + 2^{4}$).

Question 5: Suppose *Host A* sends two TCP segments back-to-back to *Host B* over a TCP connection. The first segment has the sequence number 5212; the second has the sequence number 5812. How much data (in bytes) is in the **first segment**?

A $600\,\mathrm{Bytes}$

B $580\,\mathrm{Bytes}$ assuming a TCP header of $20\,\mathrm{B}$ (i.e., without options).

C Can't say because it depends on the MSS value.

D $599\,\mathrm{Bytes}$

Question 6: Suppose *Host A* sends two TCP segments back-to-back to *Host B* over a TCP connection. The first segment has the sequence number 5212; the second has the sequence number 5812. Assuming the first segment is lost but the second segment arrives at *Host B*, what will be the **acknowledgment number** sent from *Host B* to *Host A*?

A 5211

B 5813

C 5212

D 5812

Question 7: Suppose *Host A* sends two TCP segments back-to-back to *Host B* over a TCP connection. The first segment has the sequence number 5212; the second has the sequence number 5812. Assuming the ACK for the first segment is lost but the ACK for the second segment arrives at *Host A* before any timeout, **what will *Host A* send next**?

A A retransmission of the TCP segment with the sequence number 5812.

B A new TCP segment with a new sequence number > 5812.

C A retransmission of the TCP segment with the sequence number 5212.

D A new TCP segment with a the sequence number 5812.

Question 8: A TCP fast retransmit occurs:

A After a TCP timeout timer expires for a given segment.

B When three duplicate ACKs are received by the sender.

C When one duplicate ACK is received by the sender.

D If the TCP timeout timer is set with a very short value, resulting in faster retransmissions.

Question 9: TCP's flow control depends on:

A the network's window that is included in the IP datagrams sent over the network.

B the sender's window that is included in the TCP segments sent to the receiver.

C the last sent byte being lower than the receive window, **regardless** of the last ACK'ed byte.

D the receiver's window that is included in the TCP segments sent by the receiver.

Question 10: UDP's flow control depends on:

A the sender's window that can optionally be included in the UDP datagrams sent to the receiver.

B the network's window that is included in the IP datagrams sent over the network.

C nothing because UDP does not offer flow control, which can only be supported by the transport layer.

D UDP has no built-in flow control; any pacing is purely application-defined.