RAT Test Run

Question 1: TCP uses the RTT estimate to compute what value?

A To compute the retransmission timeout value.
B To compute the receive window.
C To compute the fast retransmit threshold.
D To compute the sender window.

Question 2: 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 $17\,\mathrm{s}$ (i.e., $2^0 + 2^4$).
B It takes $128.125\,\mathrm{s}$ (i.e., $2^{-3} + 2^7$).
C It takes $128\,\mathrm{s}$ (i.e., 2^7).
D It takes $136\,\mathrm{s}$ (i.e., $2^3 + 2^7$).

Question 3: 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 4: 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 5812
B 5211
C 5813
D 5212

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. 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 new TCP segment with a new sequence number > 5812.
B A retransmission of the TCP segment with the sequence number 5212.
C A new TCP segment with a the sequence number 5812.
D A retransmission of the TCP segment with the sequence number 5812.

Question 6: A TCP fast retransmit occurs:

A If the TCP timeout timer is set with a very short value, resulting in faster retransmissions.
B After a TCP timeout timer expires for a given segment.
C When three duplicate ACKs are received by the sender.
D When one duplicate ACK is received by the sender.

Question 7: TCP's flow control depends on:

A the receiver's window that is included in the TCP segments sent by the receiver.
B the network's window that is included in the IP datagrams sent over the network.
C the sender's window that is included in the TCP segments sent to the receiver.
D the last sent byte being lower than the receive window, **regardless** of the last ACK'ed byte.

Question 8: UDP's flow control depends on:

A nothing because UDP does not offer flow control, which can only be supported by the transport layer.
B UDP has no built-in flow control; any pacing is purely application-defined.
C the sender's window that can optionally be included in the UDP datagrams sent to the receiver.
D the network's window that is included in the IP datagrams sent over the network.

Question 9: Replacement for the "Sequence Number refers to …" question (applied sequencing + ACK) *Host A* sends a TCP segment to *Host B* with **sequence number 1000** carrying **300 bytes** of application data. *Host B* has already received everything up to byte 999. The segment arrives correctly and in order. What **acknowledgment number** should *Host B* send back?

A 1300
B 1299
C 1000
D 1001

Question 10: A TCP sender has an **estimated RTT** of $100, \mathrm{ms}$ and a current **retransmission timeout (RTO)** of $200, \mathrm{ms}$. A segment is transmitted at time $t = 0$ and its ACK arrives at time $t = 250, \mathrm{ms}$. Assume no fast retransmit is triggered. What will happen?

A The sender will retransmit immediately when the ACK is late relative to the RTT estimate ($> 100, \mathrm{ms}$).
B The sender will not retransmit because any ACK arriving before $2 \cdot RTT$ prevents timeout.
C The sender will **retransmit the segment** at $t = 200, \mathrm{ms}$ (timeout) even though the ACK later arrives.
D The sender will wait for the ACK because it arrived within one RTT estimate ($100, \mathrm{ms}$).