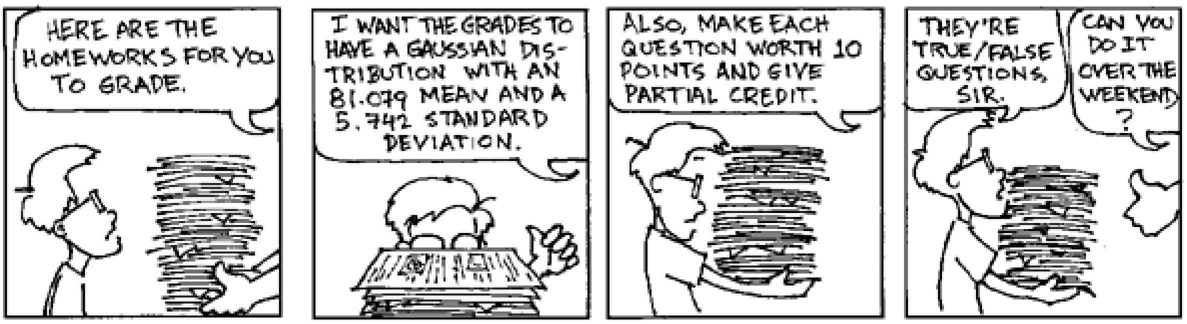


Src: Piled Higher and Deeper - Grade Adjustment Process

Below follows a discussion for some of the Quiz questions.

Q1. How many valid host addresses are available on an IPv4 subnet that is configured with a /26 mask?

A. 254
B. 190
C. 192
D. 62
E. 64

The correct answer is D (62 valid L3 host identifiers). That is valid = 2^(32-26)-2. Two addresses of this range (-2) are used to identify the subnet and broadcast address, respectively.

Q2. How does quality of service help a network support a wide range of applications and services?

A. by limiting the impact of a network failure
B. by allowing quick recovery from network failures
C. by providing mechanisms to manage congested network traffic
D. by providing the ability for the network to grow to accommodate new users

The correct answer is C. Some of you chose D – while it seems reasonable it is not. The question concerns QoS (Quality of Service), D does not mention anything in regard – I can manage to grow my network in size but this does not necessarily translate into QoS being preserved, let alone improved. Think of response times in a Request-Response protocol (e.g., HTTP).

Q3. The DNS employs

A. a client/server model
B. a peer to peer (P2P) model
C. a mix of client/server and peer to peer model
D. a none of the above

DNS is a hierarchical C/S system. In a P2P model, computation and load is shared amongst parties. To simplify, you the client do not contribute to any function of this system.

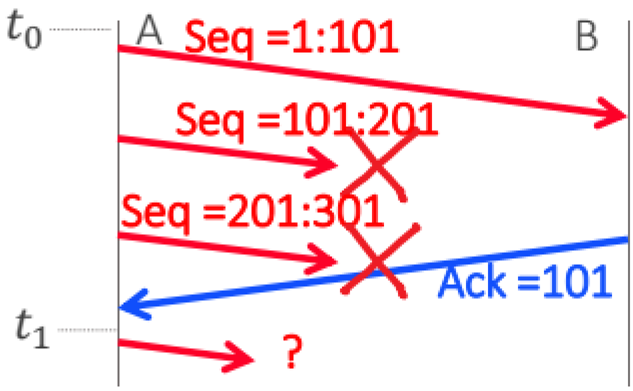
Q4. Which statements are true ?
1. In slow start, the increase is additive.
2. Slow start is used to accelerate the convergence of Additive Increase, Multiplicative Decrease

A. 1 and not 2
B. 2 and not 1
C. Neither 1 nor 2
D. 1 and 2

Recall that slow start is an exponential increase phase. Each RTT the congestion window (cwnd) duplicates. When slow start finishes (slow start threshold) the additive increase phase begins. TCP is a self-clocking, adaptive protocol designed with no *apriori* transmission medium in mind.

Q5. A and B use a fixed sliding window protocol. The window size is 300 bytes. At time t0, the protocol is initialized. Say which of the choices below is allowed for A at time t1:

A. A may transmit a packet with Seq = 301:501.
B. A may transmit a packet with Seq = 301:401.
C. A may transmit a packet with Seq = 301:601.
D. A may not transmit any new data.



The problem data state that the window size is fixed, no changes after an RTT or ACK-received. TCP can emit into the pipe a maximum of cwnd (300 byte) of un-acknowledged data at any time. (Refer to the sliding window mechanism as opposed to stop-and-wait).
Node(A) successfully receives an ACK, 2 packets are lost in transit, at time t1 it can transmit packet with SedNo(301:401). From Node(A) perspective it has 300 bytes en-route.

Q6. In which case does every router keep a detailed description of the entire network ?
A. with link state and not with distance vector.
B. both with distance vector and with link state.
C. neither with distance vector nor wit link state.
D. with distance vector and not with link state.

Link state vs Distance-Vector : Global vs Local knowledge. In distance-vector nodes broadcast own and aggregated information. In link state each node gathers each others view of the network topology. For more info., refer to the slides, or any other material on the tradeoffs between the two approaches.

Q7. A TCP source starts sending packets using the Slow-Start algorithm, starting with one transmitted packet in the first RTT. Assume that the source sends N packets, and that N is sufficiently (N > 1) small so that the source never leaves Slow-Start.
Which of the following are true:

A. All of the packets are sent consecutively before the first ACK is received
B. Assuming a fixed RTT, the time taken to transmit all the packets is approximately RTT log_2(N).
C. Assuming a fixed RTT, the time taken to transmit all the packets is approximately RTT x N.
D. The window size is increased by one each time a complete window of data is acknowledged.

Time_taken = RTT [fixed] * number_of_transmission_rounds [depends on N]; The problem data state that the connection never leaves Slow Start phase, meaning each RTT we double the sending=congestion [in this scenario] window. How many rounds does it take? Well, $\log_2(N)$.