

CS447 –Networks and Data Communications

Quiz #4, July 9, 2026 (SOLUTIONS)

Note 1: please provide your solutions to the “solution template”

Note 2: answer the questions by including only the option symbols (i.e., (a), (b), (c), and (d)). Please do NOT answer the questions by copying the actual options for each question.

#1: Which of the followings are true about how flow control works (select all that apply)?

- (a) Flow control avoids overloading network transmission cables, routers/switches, and destination host computers by controlling the signal propagation delay.
- (b) Flow control avoids overloading network transmission cables, routers/switches, and destination host computers by controlling the size of network packets transmitted at transmitting host computers.
- (c) Flow control avoids overloading network transmission cables, routers/switches, and destination host computers by controlling the number of network packets transmitted at transmitting host computers.
- (d) Flow control avoids overloading network transmission cables, routers/switches, and destination host computers by controlling the end-to-end transmission distance from a transmitting host computer to a destination host computer.
- (e) None of the above

Solution: (c)

#2: Which of the following statement(s) is (are) true about the signal propagation delay (the one we need to estimate the utilization of the network transmission bandwidth) (select all that apply)?

- (a) the signal propagation delay will be worse (i.e., longer) if the distance between a transmitting and a receiving host is shorter (assuming all other factors remain unchanged).
- (b) the signal propagation delay will be worse (i.e., longer) if the number of routers between a transmitting host and a receiving host increases (assuming all other factors remain unchanged).
- (c) the packet transmission delay will be better (i.e., shorter) if the transmission rate increases (assuming all other factors remain unchanged).
- (d) the packet transmission delay will be better (i.e., shorter) if the packet size decreases (assuming that all other factors remain unchanged).
- (e) None of the above

solution: (b) – (c), (d) can be selected without penalty

#3: Assuming that the utilization of a network transmission bandwidth is currently 40% (0.40), which of the following statement(s) is (are) true about the utilization of the network transmission bandwidth using the stop-and-wait flow control (select all that apply)?

- (a) If the transmission rate increases, the utilization will increase (assuming that all other factors remain unchanged).
- (b) If the packet size decreases (i.e., becomes smaller), the utilization will increase (assuming that all other factors remain unchanged).
- (c) If the distance between a transmitting host and a receiving host is shorter, the utilization will increase (assuming that all other factors remain unchanged).
- (d) If a more powerful processor is used at both a transmitting host and a receiving host, the utilization will increase (assuming that all other factors remain unchanged).
- (e) None of the above.

solution: (c)

#4: Which of the following statement(s) is (are) true about the sliding window flow control (select all that apply)?

- (a) Sliding window flow control usually improves the utilization of the network transmission bandwidth (compared with stop-and-wait flow control) because sliding window flow control reduces (or eliminates) the time a transmitting host computer has to wait after each packet is transmitted.
- (b) Sliding window flow control improves the utilization of the network transmission bandwidth (compared with stop-and-wait flow control) because sliding window flow control increases the signal transmission rate at a transmitting host computer.
- (c) Sliding window flow control improves the utilization of the network transmission bandwidth (compared with stop-and-wait flow control) because sliding window flow control effectively prevents intermediate routers (routers on the way from a transmitting host computer to a receiving host computer).
- (d) Sliding window flow control improves the utilization of the network transmission bandwidth (compared with stop-and-wait flow control) because sliding window flow control effectively reduces the amount of the network traffic b from a transmitting host computer to a receiving host computer).

Solution (a)

#5: Select the best option from the followings (select only one):

- (a) Using sliding window flow control, applying a larger open window size always improves the utilization of the network transmission bandwidth.
- (b) Using sliding window flow control, applying a smaller open window size always improves the utilization of the network transmission bandwidth.
- (c) Using sliding window flow control, applying a larger open window size may improve the utilization of the network transmission bandwidth, but not always.
- (d) Using sliding window flow control, applying a smaller open window size may improve the utilization of the network transmission bandwidth, but not always.
- (e) None of the above.

Solution (c) – (5 points for (a))

#6: For which of the network applications, we most likely observe more benefit from using sliding window flow control than stop-and-wait flow control. Select the best two among the following options:

- (a) Texting from a smart phone
- (b) Watching (or downloading) a movie file
- (c) Checking the current time
- (d) FTP (file transfer) applications
- (e) Telnet applications (for those who are not familiar with “telnet applications”, I suggest you to perform searches using a search engine (e.g., Google))

Solution: (b) and (d)

#7: Which of the following statements is a correct statement about the relation between “detectable errors” and “correctable errors” (select the best option):

- (f) If a packet error is detectable, it is also correctable.
- (g) If a packet error is not detectable, it is not correctable either.
- (h) If a packet error is correctable, it is not detectable.
- (i) If a packet error is not correctable, it is detectable.

Solution: (g)

#8: Which of the following statements about Selective-Reject ARQ is correct (select the best option)?

- (a) GBN ARQ is more efficient in terms of network transmission bandwidth utilization because GBN ARQ uses a larger window size than Selective-Reject ARQ.
- (b) GBN ARQ is more efficient in terms of network transmission bandwidth utilization because GBN ARQ uses a faster signal transmission rate than Selective-Reject ARQ.
- (c) GBN ARQ is more efficient in terms of network transmission bandwidth utilization because Selective-Reject ARQ uses a faster (shorter) signal propagation delay than GBN ARQ.
- (d) GBN ARQ is more efficient in terms of network transmission bandwidth utilization because GBN ARQ results in a fewer number of the network packets than Selective-Reject ARQ.
- (e) None of the above.

Solution: this question has been dropped from grading

#9: The primary motivation of using Selective-Reject ARQ instead of GBN ARQ is (select the best option):

- (a) Since receiving host computers hold (buffer) packets that are correctly received after a packet in error, Selective-Reject ARQ reduces the chances of buffer over-flow at the receiver side.
- (b) Since receiving host computers hold (buffer) packets that are correctly received after a packet in error, Selective-Reject ARQ can use a higher signal transmission rate than GBN ARQ.
- (c) Since receiving host computers hold (buffer) packets that are correctly received after a packet in error, Selective-Reject ARQ can use a larger window size than GBN ARQ.
- (d) Since receiving host computers hold (buffer) packets that are correctly received after a packet in error, Selective-Reject ARQ can use a larger packet size than GBN ARQ.
- (e) None of the above.

Solution: (e)

#10: When the window size gets larger, which of the following sentences is correct (select all that apply)?

- (a) Selective-Rject ARQ and GBN ARQ suffer (in terms of the network transmission bandwidth utilization) equally negatively (when packet error rate is not 0.0).
- (b) Selective-Rject ARQ suffers (in terms of the network transmission bandwidth utilization) more negatively than GBN ARQ (when packet error rate is not 0.0).
- (c) GBN ARQ suffers (in terms of the network transmission bandwidth utilization) more negatively than Selective-Rject ARQ (when packet error rate is not 0.0).
- (d) None of the above.

Solution: (c)