CS422 Computer Networks (Spring 2024): Homework 2

(Due Date: 23:59:59PM Wed Feb 21, 2024, Total: 30 points)

1. **True or False. (10 points, 1 point each)**

   (a) [**T** **F**] When two email servers run SMTP to exchange emails, both email servers run server processes.

   (b) [**T** **F**] We use `nslookup` for DNS query in our in-class demo. The command "nslookup -type=NS cs.purdue.edu" is to get the IP address of "cs.purdue.edu".

   (c) [**T** **F**] DNS supports two query modes: iterated query and recursive query. In the both modes, it is always required for a local DNS server to contact the root DNS server.

   (d) [**T** **F**] DASH for video streaming allows the client to watch the same video source at different rates over time.

   (e) [**T** **F**] For one web server that runs HTTP/2, query messages received from different clients will be mapped to different sockets.

   (f) [**T** **F**] UDP uses checksum to detect errors. If the computed checksum equals the checksum field value, there is no error for sure.

   (g) [**T** **F**] RDT1.0 does not provide anything for reliable data transfer because there is no need to do so given a reliable channel.

   (h) [**T** **F**] Given a channel with bit errors (but without losses), the following three mechanisms are sufficient for reliable data transfer: (1) error detection at receiver, (2) feedback (ACK and NAK) from receiver to sender, and (3) retransmission at sender. .

   (i) [**T** **F**] In Go-back-N, the loss of one ACK may not necessarily invoke a timeout.

   (j) [**T** **F**] In Selective Repeat, it is possible for the receiver to receive the packet with the sequence number smaller than the expected sequence number.

2. **(5 points)** Let us use *nslookup* to answer the following questions. If you are not familiar with *nslookup*, please read the help page for *nslookup* through **man nslookup** or online manual.

   What is the IP address of the mail server for *gmail.com*? Please describe the commands you use to obtain the answers, as well as the results.

3. **(5 points)** In RDT2.0, ACK and NAK both are used while in RDT2.2, only ACK is used. Can we also remove the NAK in RDT2.0? Why can we get ride of NAK in RDT2.2? What will RDT2.2 do if the packet has error?

4. **(5 points)** Does RDT3.0 have a fatal flaw if only two sequence numbers 0 and 1 are alternatively used for all the data packets? If yes, please give an example (plot a diagram as shown in the class). If no, please explain why not?

5. **(5 points)** In Selective Repeat, suppose the window size is 4.

   (a) (3 points) List all the possible ranges for the receiver's window when the sender's window is currently [501, 502, 503, 504].

   (b) (2 points) List all the possible ranges for the sender's window when the receiver's window is currently [501, 502, 503, 504].