[1] (4 pts) HTTP

a. Is it possible for an organization's web server and mail server to have exactly the same alias for a hostname (for example, foo.com)? What would be the type for the RR that describes the hostname of the mail server?

b. Try to access www.cse.sc.edu/~wyxu/foo.html by following the steps listed below:
Step 1: "telnet www.cse.sc.edu 80"
Step 2: Manually create an HTTP request message in your telnet session.
What message did you type in to get the webpage foo.html? Do you have to include the header line "Host: www.cse.sc.edu" in your HTTP request to access the webpage?
(Note, in Linux, execute telnet in a terminal; in Windows, execute telnet in a command prompt window.)

c. Are the following statements true or false, if it is false, explain why
- HTTP response messages never have an empty message body.
- The Date: header in the HTTP response message indicates when the object in the response was last modified
- Consider two distinct Web pages that belong to the same Web server. Both webpages can be sent over the same persistent TCP connection between a client and a Web server.
- With nonpersistent connections between browser and origin server, it is possible for a single TCP segment to carry two distinct HTTP request messages.

[2] (1 pt) In BitTorrent, suppose Alice provides chunks to Bob throughout a 30-second interval. Will Bob necessary return the favor and provide chunks to Alice in this same interval? Why or why not?

[3] (1 pts) What is out-of-band communication? Do HTTP, FTP, SMTP or DNS use out of band communication?

[4] (2 pt) Suppose within your web browser you click on a link to obtain a Web page. The IP address for the associated URL is not cached in your local host, so a DNS lookup is necessary to obtain the IP address. Suppose that n DNS servers are visited before your host receives the UP address from DNS; the successive visits incur and RTT (round trip time) of $RTT_1, RTT_2 \cdots RTT_n$. Further suppose that the Web page associated with the link contains exactly one object, consisting of a small amount of HTML text. Let RTT_0 denote the RTT between the local host and the server containing the object. Assuming zero transmission time of the object, how much time elapses from when the client clicks on the link until the client receives the object?

[5] (2 pts) Let RTT be the round trip delay between the client and the server. Suppose the HTML file references 20 very small objects on the same server. Neglecting transmission times or TCP slow start, how much time elapses with

a. Non-persistent HTTP with no parallel TCP connections?

b. Non-persistent HTTP with up to 5 parallel connections?

c. Persistent HTTP?