ECE:3540 Communication Networks
Fall 2015
Second Homework Assignment
Due Date: Tues, Sept. 15, in-class

1. Use telnet to connect to the college of engineering web server (www.uiowa.edu), then issue a GET command to request the base page index.html. (Note: telnet will not work with the University wireless network due to firewall issues. It will work with on-campus wired Ethernet and should also work with most off-campus wired or wireless networks.) Based upon this exchange with the web server, answer the following questions:

   a. What web server software and version does the site use?

   b. When was the index.html page last updated?

   c. Does the web-server use persistent or non-persistent connections, by default? (Note: you may need to consult the HTTP RFC or other available on-line documentation?) Explain how you determined your answer?

2. This problem investigates the use of cookies for HTTP session management and other purposes. Open the Mozilla Firefox web browser on a Windows computer. (The instructions here assume the current Firefox desktop version. If you are using an older version of Firefox or another type of device, the process may be slightly different.)
   From the menu bar at the bottom of the start page, select "Options" and then select "privacy" from the menu at the left side of the Options page. Click on the "remove individual cookies" link. This should display a window showing all cookies currently cached by the browser.
   Click on the "Remove All " button to clear the browser's cookie cache.
   Now use the browser to access the page www.amazon.com.
   Now, again using the "remove individual cookies" option, observe the new cookies that have been added to the browser's cookie cache.

   a. List the name and expiration date for each amazon.com cookie added to the browser cache as a result of accessing the amazon.com home page and indicate for each if it is a session cookie or a persistent cookie. (You do not need to list cookies for domains other than amazon.com--e.g. adnx.com).

   b. What is the expiration interval for the amazon.com session?

   Now select an item on the amazon.com page and add it to your shopping cart. (Don't worry. You won't have to purchase the item to complete the assignment.)
   View the shopping cart to confirm that the selected item is in the cart. Exit the shopping cart view and return to the main amazon.com page.

Now, using the "remove selected cookies" option, remove the amazon.com cookies, one by one, from the cache. After removing each cookie, again check the shopping cart to see if the selected item still remains. Note that some deleted cookies may be reconstituted as a result of viewing the shopping cart.

c. Which cookie's deletion results in losing the contents of the shopping cart? Based upon this observation, how long could an un-purchased item potentially remain in your shopping cart?

d. What do you think is the purpose of all of the cookies, other than amazon.com cookies, that were added to the cookie cache as a result of the initial access to the amazon.com homepage?

e. IETF RFC 6265 defines the use of cookies in HTTP. According to the RFC, can a web server set a cookie for a domain other than its own—e.g. could the amazon.com web server set a cookie for the domain doubleclick.net? What is the number of the relevant subsection of RFC 6265?

f. Based upon your answer to part e) above, how do you think that the non-amazon cookies were set as a result of your initial access to the amazon.com web site?

3. Log on to any machine that supports the "dig", "nslookup", and "whois" commands (e.g., use secureCRT to telnet to login.engineering.uiowa.edu). Study the three commands' man pages and then answer the following questions.

(a) Determine the DNS delegation chain for www.engineering.uiowa.edu, starting from any of the 13 root servers ([a-m].root-servers.net) by first invoking
dig @<name.of.root.server> NS edu +norecurse
to find the top-level edu domain server(s),
then invoking dig on a top-level edu name server to find the name server(s) for the uiowa.edu domain, and finally, invoking dig on a uiowa.edu name server to find the name server(s) for the engineering.uiowa.edu subdomain. Show the delegation chain, listing all name servers identified at each level.

(c) Use "nslookup" to determine whether there is a host on campus named www.uiowa.edu. If there is, provide its IP address. If there is not, determine the actual name(s) and IP address(es) of the host(s) serving www.uiowa.edu.

(d) Use "dig" or "nslookup" to determine the IP addresses of the engineering mail server(s) mail.engineering.uiowa.edu

4. Consider a web page whose base page is of size S_1 bits. Suppose that the page references 12 objects of size S_2 bits each located on the same server. Suppose further that the round-trip time to the server is RTT0 seconds, the bottleneck capacity (set by a dedicated ISP connection) is C bps and that four DNS servers are visited before the host receives the base page IP address, with the successive DNS visits incurring delays of RTT_1,. . . , RTT_4 seconds, respectively. Assuming that the DNS packet

transmission time and all other packetization delays and header overheads are negligible, how much time elapses when:

(a) HTTP/1.0 is used with no parallel connections?

(b) Persistent HTTP/1.1 is used with no parallel connections?

(c) Non-persistent HTTP/1.1 is used with three parallel connections?

5. Text Book (fifth or sixth edition), Chapter 2, problem P22