

## Homework 1

CSE 310 Fall 2021

Due date: **September 15, 2021; 11:59 PM**

Submission via Blackboard.

**1. True or false? Please provide a reasoning (1-2 sentences) for your answer. (10 points)**

- a. A user requests a Web page that consists of an html file which contains the URLs to three images. Assume that HTTP/1.1 protocol is being used with persistent connection but no parallelization or pipelining. To render this page, the client will send one HTTP request and receive four HTTP responses.
- b. Two distinct Web pages (for example, <https://www.cs.stonybrook.edu/about-us.html> and <https://www.cs.stonybrook.edu/admissions.html>) can be requested and received over the same persistent HTTP connection.
- c. If I want to transfer a file from my friend's computer, I have to use a standard application layer protocol such as HTTP and cannot write my own protocol.
- d. Before you start sending application-layer request and response, you need to set up a connection. This connection set up is primarily to ensure that the connection is secure.
- e. A root nameserver can return an authoritative response for any domain name.

**2. (6 pt) What are the major differences between HTTP 1.0 and HTTP 1.1?**

**3. (4 pt) Consider a client that wants to retrieve a Web document at a given URL. The IP address of the server is initially unknown. What application-layer protocols are needed in this scenario?**

**4. (10 pt) What is the function of a DNS server? Please describe how an iterative query and a recursive query will be handled by DNS servers.**

**5. (10 pt) In this problem, we use the useful dig tool available on Unix and Linux hosts to explore the hierarchy of DNS servers. Recall that a DNS server higher in the DNS hierarchy delegates a DNS query to a DNS server lower in the hierarchy, by sending back to the DNS client the name of that lower-level DNS server. First read the man page for dig (e.g., <http://linux.die.net/man/1/dig>), and then answer the following question.**

Starting with a root DNS server (from one of the root servers [a-m].root-servers.net), initiate a sequence of queries for the IP address for your department's Web server (www.cs.stonybrook.edu) by using dig. Show the list of the names of DNS servers in the delegation chain in answering your query.

Back up your answers with screen shots that show the results of your *dig* queries.

6. **(10 pts)** A server [www.foo.com](http://www.foo.com) is interested in using a CDN to scale its operations. To do this, foo.com registers an image on its site (img1.foo.com) with the CDN and receives a CNAME.
- (i) Explain how foo.com uses DNS redirection so that a browser will download the image from the CDN instead of the server
  - (ii) Explain how foo.com redirects the browser to the CDN but does not use DNS redirection