Exam 1 Review Questions

In addition to questions related to the exercises and quizzes, there will be questions on the exam related to the content in the videos. The questions below illustrate the kinds of questions I may ask.

Binary Representations and Encodings

1. How many binary digits (bits) are needed to represent a single hexadecimal digit?
2. How many bits in a byte?
3. How many hexadecimal digits are needed to represent a byte?
4. How many bits are required to store an ASCII character? How many bytes (in a TCP transmission)?
5. How many bits are required to store an ISO-8859-1 (Latin-1) character? How many bytes (in a TCP transmission)?
6. Give an example of a character in the ISO-8859-1 character set that starts with the bit "1"
7. Give an example of a character in the ISO-8859-1 character set that starts with the bit "0"
8. a. (As on exercise) Encode Unicode code-point U+2339 in UTF-8.
    b. How many bytes are required to store this character when encoded in UTF-8?
9. How many bits are required to store the smallest code-points in UTF-16? How many bytes?
10. In a network protocol, what four key elements are specified by the protocol?
11. Give an example of when an action might be taken on the non-receipt of a message.
12. How many bits are required to store the largest Unicode code-point currently assigned? (This character is 10FFFF.) How many bits are needed to store the encoding of this code point in UTF-8?
13. Suppose the string "garçon - boy" is represented as a sequence of ISO-8859-1 (Latin-1) bytes. The letter ç does not appear in the ASCII character set. ***Write*** the most significant bit (MSB) of the fourth byte in the string. ***Explain*** your answer**.**

Protocol Stack

14. What is the primary role of protocols in the Transport layer of the protocol stack? How about the Network layer?
15. What does the transport layer of the protocol stack provide to the layers above it?
16. What does the application layer of the protocol stack provide?
17. Which protocol comes higher in the protocol stack? (That is, which protocol builds on the other?)
    b. Link or Network?
    c. Link or Transport?
    d. Physical or Application?
18. Which level of the protocol stack is the _____ protocol found in?
    e. TCP
    f. UDP

g. HTTP

19. List two differences between TCP and UDP. List two reasons why an application might want to use UDP instead of TCP.
20. Which level of the protocol stack would implement the way bits are sent over wire, fiber-optic, or radio?
21. In which layer of the protocol stack does (unicast) routing occur?'

Python

22. Write a line of python code which
    h. Converts a string, e.g. "1234" to an integer hold the decimal number.
    i. Given a number, e.g., 1234 stored in the variable number, prints The number _____ is ____, where the first blank holds the number, and the second blank holds whether the number is positive, negative, or zero. (e.g. for the value above, prints "The number 1234 is positive")
    j. Write a line of python code to print the first element in my_list
23. Are lists in Python 0-indexed or 1-indexed?
24. What is printed by…

```
my_list = [5,3,2,7,6]
print my_list[3]
```

25. What does the following python code print?

```
for index in range(5):
  print index
```

26. What does the ord function do in Python?
27. Why does main() come at the end of a Python file?

Sockets

28. In the python socket interface, for the recv(…) method, what does a return value of "" (a 0-length string) indicate?
29. When calling the Python recv(…) method, suppose there are 1000 bytes remaining to be received, and the call to recv is made as: `data = my_socket.recv(200)`?
    k. What is the minimum number of bytes in `data` after the call?
    l. What is the maximum number of bytes in `data`?
30. Under what conditions will the recv method "block" (that is, wait at the code-line) when it is called?
31. socket.bind accepts a tuple as an argument. What are the element of this tuple?
32. Suppose you wish to open a TCP server that listens on both your wireless connection and your wired connection. Give an example of a host field value you could use to accomplish this.
33. When creating a socket, what does socket.SOCK_STREAM indicate about the socket? How about socket.SOCK_DGRAM?

HTTP

34. What does the header “Connection: close” indicate? How about “Connection: keep-alive”?
35. What does the header “Date: …” indicate?
36. What does the header “Last-Modified: …” indicate?
37. What does the header “Content-Type: text/html” indicate?
38. What does the header “Transfer-Encoding: chunked” indicate?
39. What does the header “Content-Length: 1105” indicate?

DNS

40. What are the purpose(s) of DNS?
41. How does a DNS server accomplish load balancing?
42. What is an authoritative DNS server?
43. How does DNS allow one domain name to map to different servers for web services and for mail services?
44. How does DNS allow multiple domain names to map to the same IP address?
45. What mapping does an NS record provide? What DNS capability does this help provide?
46. What mapping does an A record provide? What DNS capability does this help provide?
47. What mapping does an MX record provide? What DNS capability does this help provide?
48. What mapping does a CNAME record provide? What DNS capability does this help provide?
49. Why do local DNS servers have time limits?
50. What transport-layer technology is used to carry DNS traffic?
51. What transport-layer technology is used to carry HTTP traffic?
52. What does the local DNS server do the first time it receives a request to lookup a specific domain? (Describe the steps in detail.)
53. What does the local DNS server do the second time it receives a request to lookup a specific domain?