CS447-003 Network and Data Communication
Possible Quiz Questions for
Quiz #9 on April 4th, 2024 (SUGGESTIONS)

The following is a list of possible questions for our Quiz #9 on April 4th. Some of the questions will not be asked in the quiz. All the questions that will appear in the quiz will appear exactly as shown below (however, parameters may be changed). The quiz is closed textbook, closed notes and closed neighbors. Note that the questions, which did not appear in this quiz, still may appear in the exams.

#1: What is "IP address" (what does each IP address represent)?

#2: Each IP address consists of two "addresses". What are they?

#3: What is "domain address"?

#4: What is "host address"?

#5: Why does each IP address consist of two addresses of "domain address" and "host address" (what is the motivation behind the design)?

#6: What is "DHCP" for?

#7: Why can not some host computers in a network domain be dynamically assigned an IP address by DHCP?

#8: What is "subnet"?

#9: What is "subnet" for?

#10: Mention two purposes of subnet mask.

  (a) To find (identify) the bits for the host address in each IP address

  (b) To find (identify) the bits for the subnet address in each IP address

    Note: it is assumed that we (or routers) can find the bits for the domain address using the CIDR-prefix (or the domain class).

#11: Is "254.254.80.90" a valid subnet mask? If yes, how it is a valid subnet mask? If not, why not?

254.254.80.90 = 1111111<u>0</u>.11111110.1010000.1011010

No. It is not a valid subnet-mask.

It is not valid, because of the underlined '0'. In any subnet mask, once '0' appears (from the left hand side), we can not have '1'.

#12: Given a following IP address: 191.56.98.201/10 and there are up to 64 sub-networks in that domain, find <u>the actual host address</u> (without including the sub-network address) ~~if the domain's subnet mask is "255.255.240.0"~~. Show all your work. **Note**: the parameters (the IP address, IP prefix, the number of sub-networks and the subnet mask) will be changed in the real quiz question.

See the suggested solution for #16.

#13: What does "CIDR" stand for?

#14: How many host computers can exist for a network domain that has "/25" CIDR block-prefix?

#15: How do Internet core routers use CIDR block-prefix?

#16: Given a following IP address: 191.56.98.201/10 and there are up to 64 sub-networks in that domain, find <u>the sub-network address</u> ~~if the domain's subnet mask is "255.255.240.0"~~. Show all your work. **Note**: the parameters (the IP address, IP prefix, the number of sub-networks and the subnet mask) will be changed in the real quiz question.

The "/10" CIDR-prefix indicates that the first 10 bits represent the domain address. With up to 64 subnets, we need $\log_2(64) = 6$ bits for the subnet address.

Thus, the subnet mask is:

11111111.11111111.00000000.00000000 = "255.255.0.0"

- domain-address bits
- subnet-address bits
- host address bits

191.56.98.201 = 10111111.00111000.01100010.11001001

domain address = 10111111.00111000.01100010.11001001
             = 10111111.00000000.00000000.00000000
             = 191.0.*x*.*x*

sub-network address (6 bits in before host add) = 00000000.00111000.00000000.00000000
                                            = 0.56.0.0 (or just "56")

host Address (last <u>16 bits</u>) = 000000.00000000.01100010.11001001
                            = *x*.*x*.98.201 (or "0.0.98.201").

#17: If a domain has 8,000 host computers (i.e., needs 8,000 IP addresses) and if the domain is supposed to have 10 subnets, what is its subnet mask (answer in the standard "*x.x.x.x*" format, where '*x*' is a decimal number between 0 and 255)?

With 8,000 host computers, we need (*ceiling* ($\log_2$(8,000)) = *ceiling* (12.966) = 13) 13 bits for the host addresses.

With 10 subnets, we need (*ceiling* ($\log2$(10)) = *ceiling* (3.32) = 4) 4 bits for the subnet address 32 - (4 + 13) = 15 bits for the domain address.

subnet-mask = 11111111.11111111.11100000.00000000 = 255.255.224.0