

CS 447-002 Networks and Data Communications
Spring 2024
Quiz #8 on April 3, 2024 (**SOLUTION**)

Your Last Three Digits: _____
(please do NOT write all of your student ID or your name)

Grade: _____

(1) What is “IP address” (what does each IP address represent)?

IP addresses are the unique identifiers for each network interface (NIC).

(2) Why does each IP address consist of two addresses of “domain address” and “host address” (what is the motivation behind the design)?

Since internet core-routers can route packets to their destinations only using the domain addresses (instead of using the entire IP addresses) routing will be faster (the routing tables the internet core routers maintain/search will be smaller).

(3) How do Internet core routers use CIDR block-prefix?

Internet core routers use only the first bits specified by the CIDR (block-) prefix. For example, the routers use (look at) only the first 10 bits in such IP addresses if they have “/10” prefix when they route packets to those destinations (domains).

(4) 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 = 11111110.11111110.1010000.1011010

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’.

252.255.1.255 = 11111110.01111110.1010000.1011010

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’.

(5) Given a following IP address: 191.56.98.201/10 and there are up to 64 sub-networks in that domain, find 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.

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