

CS447 – Networks and Data Communications

Quiz #3, June 30, 2026 (SOULTIONS)

Note 1: please provide your solutions to the “solution template”

Note 2: answer the questions by including only the option symbols (i.e., (a), (b), (c), and (d)). Please do NOT answer the questions by copying the actual options for each question.

#1: Which of the followings is a correct description of “IP addresses (except for class-D and E) addresses” (select the best option):

- (a) IP addresses are identifiers of a host computer.
- (b) IP addresses are identifiers of a host computer for non-technical Internet users (such as www.siu.edu).
- (c) IP addresses are identifiers of a host computer mainly for reducing packet collisions in local area networks.
- (d) None of the above.

Solution: (d) – IP addresses are unique identifiers for network interface cards.

#2: Which of the following descriptions is a correct description of domain and host addresses in IP addresses (select the best option):

- (a) Domain addresses are used by the routers and switches within a network domain, while host addresses are used by the (core) routers in the Internet backbone.
- (b) Host addresses are used by the routers and switches within a network domain, while domain addresses are used by the (core) routers in the Internet backbone.
- (c) Both domain and host addresses are used by the (core) routers in the Internet backbone.
- (d) Both domain and host addresses are used by the routers and switches within a network domain.

Solution: (b)

#3: Which of the followings is a correct description of the three-class (class-A, B, and C) IP addresses (select the best option):

- (a) The three-class IP address structure was invented because having the three-class structure makes routers/switches to handle (forward) packets to their right direction quicker.
- (b) The three-class IP address structure was invented because having the three-class structure will make human users easy to use the Internet.
- (c) The three-class IP address structure was invented because having the three-class structure allows network domains to be different sizes (in terms of the number of host computers in each domain).
- (d) The three-class IP address structure was invented because having the three-class structure will make the Internet secure.

Solution: (c)

#4: For which of the following subnet masks is (are) possible (select all that apply)?

- (a) 11111111.00110000.00000000.00000000
- (b) 00000000.00000000.00000011.11111111
- (c) 00000000.00110000.00011111.11111111
- (d) 11111100.00000000.00000000.00000000
- (e) None of the above.

Solution: (e) – subnet masks should have all consecutive ‘1’ from the LHS (once ‘0’ appears, we can’t have any ‘1’ after the ‘0’ in the subnet mask).

#5: Which of the followings is a correct description of “subnets” (select the best one)?

- (a) Subnets are for partitioning the Internet.
- (b) Subnets are for partitioning local area networks.
- (c) Subnets are for partitioning host computers.
- (d) None of the above.

Solution: (d) – subnets “domains”

#6: Which of the followings are true about subnet masks (select the best (one) option)?

- (a) The subnet mask bits are raised to '1' for the domain address.
- (b) The subnet mask bits are raised to '1' for the subnet address
- (c) The subnet mask bits are raised to '1' for the domain address and the host address
- (d) The subnet mask bits are raised to '1' for the domain address and the subnet address
- (e) The subnet mask bits are raised to '1' for the subnet address and the host address
- (f) None of the above.

Solution: (d)

#7: Which of the followings is a correct description about the internal structure of IP addresses from the LSB to the MSB bits?

- (a) The domain address, the subnet address, followed by the host address
- (b) The subnet address, the domain address, followed by the host address
- (c) The host address, the subnet address, followed by the domain address
- (d) The domain address, the host address, followed by the subnet address

Solution: (c)

#8: Which of the correct descriptions for the purpose of the CIDR (Classless Inter Domain Routing) is correct (select the best option)?

- (a) CIDR was introduced to make internet routing more reliable for reducing the probability of forwarding IP packets to incorrect destinations.
- (b) CIDR was introduced to make internet routing more secure for avoiding IP packets from going through untrusted domains.
- (c) CIDR was introduced to make internet routing more secure for avoiding IP packets from going through untrusted domains.
- (d) CIDR was introduced to have more domains in the Internet than the three-class IP address structure.

Solution: (d)

#9: Which of the followings are true about subnet masks (select all that apply) – if someone outside of your domain receives your subnet mask (without any other information)?

- (a) Using a subnet mask, we can identify the size (how many host computers) of a network domain.
- (b) Using a subnet mask, we can identify the host address in an IP address.
- (c) Using a subnet mask, we can identify the domain address in an IP address.
- (d) Using a subnet mask, we can identify the type of a domain (commercial, non-profit, government, and etc.).
- (e) None of the above.

Solution: (a) and (c)

#10: Which of the followings is (are) correct (select all that apply):

- (a) A domain that is represented by a CIDR-prefix of /13 while the domain has (consists of) three subnets is equivalent to 2 Class-B domains each of which does not have a subnet (i.e., a Class-B domain that does not have any subnet).
- (b) A domain that is represented by a CIDR-prefix of /14 while the domain has (consists of) three subnets is equivalent to a 16 Class-C domain without a subnet (i.e., a Class-C domain that does not have any subnet).
- (c) A domain that is represented by a CIDR-prefix of /16 while the domain has (consists of) three subnets is equivalent to a 1/1024 Class-A domain without a subnet (i.e., a Class-A domain that does not have any subnet).
- (d) A domain that is represented by a CIDR-prefix of /18 while the domain has (consists of) three subnets is equivalent to a 1/4 Class-B domain without a subnet (i.e., a Class-B domain that does not have any subnet).
- (e) None of the above

Solution: (d)

- CIDR-prefix: /13 $\rightarrow 2^{(32-13)} = 2^{19}$ host addresses $\rightarrow 2^{19}/2^8 = 2^{11}$ (= 2,048) Class-C domains
- CIDR-prefix: /14 $\rightarrow 2^{(32-14)} = 2^{18}$ host addresses $\rightarrow 2^{18}/2^8 = 2^{10}$ (= 1,024) Class-C domains
- CIDR-prefix: /16 $\rightarrow 2^{(32-16)} = 2^{16}$ host addresses $\rightarrow 2^{16}/2^{24} = 1/2^8$ (= 1/256) Class-A domains
- CIDR-prefix: /18 $\rightarrow 2^{(32-18)} = 2^{14}$ host addresses $\rightarrow 2^{14}/2^{16} = 1/2^2$ (= 1/4) Class-B domains