CS 447-004 Networks and Data Communications
Fall 2023
Quiz #10 on November 7, 2023 (SOLUTIONS)

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

Grade: ______

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(1) Fill (complete) (some) of the rows in the following table (answer only the specified in the table below):

<table>
<thead>
<tr>
<th>CIDR Block Prefix</th>
<th># Equivalent Class-C</th>
<th># of Host Addresses</th>
</tr>
</thead>
<tbody>
<tr>
<td>/27</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note 1: For “# Equivalent Class-C”, if it is less than 1, answer it using a fraction in the format of ‘1/n’, where ‘n’ is an integer.

Note 2: Show your work for full credit.

1 class-C domain has 2^8 = 256 host computers

/27’ domains have 2^(32-27) = 2^5 = 32 hosts

Since, 2^5/256 = 2^5/2^8 = 1/2^3 = 1/8 (each ‘27’ domain is 1/8 of a class-C domain)
(2) What information does “Membership” field in each BGP UPDATE carries (explain why it is necessary in “BGP UPDATE”)?

“Membership” field in each “BGP UPDATE” indicates the destination domain address.

(3) Show the structure of the BGP routing table.

(4) What is “default gateway (router)”?

Default gateway routers are a router in each network domain that represents its network domain by performing:

① It disseminates the information about that (network) domain (who it is and how to reach it), by constructing and sending the domains “BGP UPDATE”.

② Forwards (and receives) all the outgoing network traffic from within its domain to the ISP this particular domain is connected to.

(5) The tier-1 ISPs are different from any other ISPs (those in tier-2 and tier-3). How (what is the most essential difference)?

The tier-1 ISPs are different from any other ISPs (tier-2 and tier-3 ISPs) in that the tier-1 ISPs do not “pay” to other ISPs for handling their outgoing network traffic. For example, a tier-3 ISP pays to a tier-2 ISP for the tier-3 ISP’s outgoing network traffic. The tier-1 ISPs are called “settlement-free ISPs” because of that.