

CS 542 – Computer Network Fundamentals 1

Fall 2020 - Homework - 1 (45 points)

Instructions:

- Please submit soft copies on the blackboard.
- Team submissions are accepted.
- Team of 1 – 3 is accepted.
- For team submissions, one submission is sufficient. Anyone from the team can submit—no need for everyone in the team to submit.
- All should submit typewritten documents, not handwritten ones.
- **Show the complete step by step solution for full credits. If there is no proper explanation and justification to your final answer, only partial credits are given, even though your answer is correct.**
- Please contact **Viswatej Kasapu** (vkasapu@hawk.iit.edu) if something is not clear.
- The due date is **Sunday, Nov 01, 2020, at 11:59 PM CST (midnight).**
- **Submissions after the due date are not accepted.**
- All solutions should match the format explained in the lecture. For example, the routing table format in question 13 should match the format described in the lecture.

1. What is the range of address of the 100th block of Class A? (2 points)
2. What are the network address, net id, and host id for the IP address 172.168.5.4? (Assume classful addressing) (1.5 points)
3. Convert the number ADBC91E0 in the hexadecimal base to the 256-base system directly. **DO NOT** convert these numbers into the binary or decimal system (2 points)
4. Subtract the number 254.193.47.26 from 192.34.29.255. Give the result in the 256-base system. **DO NOT** convert these numbers into the binary or decimal, or hexadecimal system. (3 points)
5. What is the 199th address in the 2²⁰ (2 ^ 20) block of Class C? (3 points)
6. Consider the following routing table (the next-hop address is omitted): (3.5 points)

Mask	Network address	Interface
/27	155.232.55.0	M0
/26	132.176.97.0	M1
/25	132.176.97.128	M2

/24	198.104.162.0	M3
Default	Default	M4

Give the interface number for a packet whose destination IP address is:

- a. 132.176.97.173
 - b. 132.176.97.32
 - c. 155.232.55.192
 - d. 155.232.55.27
 - e. 198.104.162.128
 - f. 198.104.161.192
 - g. 132.176.97.120
7. Give the mask in the dotted-decimal notation: **(4 points)**
 - a. For a block of Class A which results in 32 subnets
 - b. Which combines 2048 Class C blocks into a supernet
 - c. For a block of Class B which results in 64 subnets
 - d. Which combines 16 Class B blocks into a supernet
 8. Find the network address, the direct broadcast address, and the number of addresses in a block; if one of the addresses in this block is 175.120.240.17/19 **(3 points)**
 9. Convert the decimal number **1819111023.439246416091794** to the base 256 system. Show all the intermediate steps. Don't miss a decimal point in this number. **(5 points)**
 10. The 49th address of a block assigned to a specific organization is 185.175.79.48. The organization needs a total of 128 addresses. Find the mask and define this block of addresses. Is there any wastage of the IP addresses? If yes, how many? **(4 points)**
 11. An organization is granted the block 178.49.240.0/20. The administrator wants to create 128 subnets. Find the following. **(4 points)**
 - a. The subnet mask (give value in /n notation)
 - b. The number of addresses in each subnet
 - c. Subnet address of the 100th subnet.
 12. An Internet Service Provider (ISP) has the following block of IP address 192.37.128.0/17. The ISP gave the first 1024 addresses to Organization A and the next available subblock of 16384 addresses to Organization B and retained the remaining IP addresses. Give the

subblocks and the valid range of addresses allocated to organizations A & B and the range of remaining addresses. **(4 points)**

13. Consider the network configuration below. A packet arrived at the router R3 with the destination address 170.14.7.47. Show how it is forwarded. (Assume classful addressing). Create a routing table for router R3. **(6 points)**

