CSIS 330 – Lab 14: Fundamentals of Subnetting Answer Template

# Problem 1:

# IP address: 192.168.10.0 /27 (given)

1. Subnet Mask **255.255.255.224**
2. Bits Borrowed: **3**
3. Number of subnets **8**
4. Magic number: **32**
5. Number of valid hosts per subnet **30**
6. (Sub) network address of subnet 0: **192.168.10.0**
7. First usable host address in subnet 0: **192.168.10.1**
8. Last usable host address in subnet 0: **192.168.10.30**
9. Broadcast address in subnet 0: **192.168.10.31**
10. (Sub) Network address in **subnet 3**: **192.168.10.64**
11. Last usable host address in subnet 4: **192.168.10.158**

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| --- | --- | --- | --- | --- |
| Subnet | Subnet address | 1st Host address | Last Host address | Broadcast |
| 0 | 192.168.10.0 | 192.168.10.1 | 192.168.10.30 | 192.168.10.31 |
| 1 | 192.168.10.32 | 192.168.10.33 | 192.168.10.62 | 192.168.10.63 |
| 2 | 192.168.10.64 | 192.168.10.65 | 192.168.10.94 | 192.168.10.95 |
| 3 | 192.168.10.96 | 192.168.10.97 | 192.168.10.126 | 192.168.10.127 |
| 4 | 192.168.10.128 | 192.168.10.129 | 192.168.10.158 | 192.168.10.159 |
| 5 | 192.168.10.160 | 192.168.10.161 | 192.168.10.190 | 192.168.10.191 |
| 6 | 192.168.10.192 | 192.168.10.193 | 192.168.10.222 | 192.168.10.223 |
| 7 | 192.168.10.224 | 192.168.10.225 | 192.168.10.254 | 192.168.10.255 |

# Problem 2

# IP address: 192.168.10.0 / 26 (given)

1. Subnet Mask **\_\_\_255.255.255.192\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
2. Bits Borrowed: **\_\_2\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
3. Number of subnets **\_\_4\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
4. Magic number: **\_\_64\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
5. Number of valid hosts per subnet **\_\_62\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
6. (Sub) network address of **subnet 0**: **\_\_192.168.10.0\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
7. First usable host address in **subnet 0**: **\_\_192.168.10.1\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
8. Last usable host address in **subnet 0**: **\_\_192.168.10.62\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
9. Broadcast address in **subnet 0**: **\_\_\_\_\_\_\_\_192.168.10.63\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
10. (Sub) Network address in **subnet 1**: **\_\_\_\_\_192.168.10.128\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
11. Last usable host address in **subnet 2**: **\_\_\_\_192.168.10.254\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

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| --- | --- | --- | --- | --- |
| Subnet | Subnet address | 1st Host address | Last Host address | Broadcast |
| 0 | 192.168.10.0 | 192.168.10.1 | 192.168.10.62 | 192.168.10.63 |
| 1 | 192.168.10.64 | 192.168.10.5 | 192.168.10.126 | 192.168.10.127 |
| 2 | 192.168.10.128 | 192.168.10.129 | 192.168.10.190 | 192.168.10.191 |
| 3 | 192.168.10.192 | 192.168.10.193 | 192.168.10.254 | 192.168.10.255 |
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# Problem 3

# IP address: 192.168.10.0 (given)

# Subnet Mask: 255.255.255.240

1. Slash prefix: **\_\_\_192.168.10.0/28\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
2. Bits Borrowed: **\_\_\_4\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
3. Number of possible subnets **\_\_\_16\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
4. Magic number: **\_\_\_16\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
5. Number of usable hosts per subnet **\_\_14\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
6. (Sub) network address of **subnet 0**: **\_\_\_192.168.10.0\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
7. First usable host address in **subnet 0**: **\_192.168.10.1\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
8. Last usable host address in **subnet 0**: **\_\_192.168.10.14\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
9. Broadcast address in **subnet 0**: **\_\_\_\_\_\_\_192.168.10.13\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
10. (Sub) Network address in **subnet 1**: **\_\_\_\_192.168.10.16\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
11. Last usable host address in **subnet 2**: **\_\_\_192.168.10.46\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Subnet | Subnet address | 1st Host address | Last Host address | Broadcast |
| 0 | 192.168.10.0 | 192.168.10.1 | 192.168.10.14 | 192.168.10.13 |
| 1 | 192.168.10.16 | 192.168.10.17 | 192.168.10.30 | 192.168.10.29 |
| 2 | 192.168.10.32 | 192.168.10.33 | 192.168.10.46 | 192.168.10.45 |
| 3 | 192.168.10.64 | 192.168.10.65 | 192.168.10.58 | 192.168.10.57 |
| 4 | 192.168.10.96 | 192.168.10.97 | 192.168.10.110 | 192.168.10.109 |
| 5 | 192.168.10.128 | 192.168.10.129 | 192.168.10.142 | 192.168.10.141 |
| 6 | 192.168.10.160 | 192.168.10.161 | 192.168.10.174 | 192.168.10.173 |

# Problem 4

# IP address: 192.168.10.0 (given)

# Minimum number of subnets needed: 31

1. Slash prefix: **\_\_\_\_\_\_192.168.10.0/31\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
2. Subnet Mask **\_\_\_\_\_255.255.255.254\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
3. Bits Borrowed: **\_\_\_5\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
4. Number of possible subnets **\_\_\_\_\_32\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
5. Magic number: **\_\_\_\_\_32\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
6. Number of valid hosts per subnet **\_\_\_30\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
7. (Sub) network address of **subnet 0**: **\_\_192.168.10.0\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
8. First usable host address in **subnet 0**: **\_\_192.168.10.1\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
9. Last usable host address in **subnet 0**: **\_\_192.168.10.30\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
10. Broadcast address in **subnet 0**: **\_\_\_\_\_\_192.168.10.31\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
11. (Sub) Network address in **subnet 1**: **\_\_\_192.168.10.32\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
12. Last usable host address in **subnet 2**: **\_\_192.168.10.94\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Subnet | Subnet address | 1st Host address | Last Host address | Broadcast |
| 0 | 192.168.10.0 | 192.168.10.1 | 192.168.10.30 | 192.168.10.31 |
| 1 | 192.168.10.32 | 192.168.10.33 | 192.168.10.62 | 192.168.10.61 |
| 2 | 192.168.10.64 | 192.168.10.65 | 192.168.10.94 | 192.168.10.93 |
| 3 | 192.168.10.96 | 192.168.10.97 | 192.168.10.126 | 192.168.10.125 |
| 4 | 192.168.10.128 | 192.168.10.129 | 192.168.10.158 | 192.168.10.157 |
| 5 | 192.168.10.160 | 192.168.10.161 | 192.168.10.190 | 192.168.10.189 |

# Problem 5

# IP address: 192.168.10.0 (given)

# Minimum number of hosts needed per subnet: 16

(Remember that the goal is to find a solution that will waste as few host addresses as possible but still satisfy the requirements.)

1. Slash prefix: **\_\_\_\_192.168.10.0/16\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
2. Subnet Mask **\_\_\_255.255.0.0\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
3. Bits Borrowed: **\_\_\_0\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
4. Number of possible subnets **\_\_\_16\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
5. Magic number: **\_\_\_65536\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
6. Number of valid hosts per subnet **\_\_\_\_65534\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
7. (Sub) network address of **subnet 0**: **\_\_\_\_192.168.10.0\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
8. First usable host address in **subnet 0**: **\_\_\_192.168.10.1\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
9. Last usable host address in **subnet 0**: **\_\_192.168.10.14\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
10. Broadcast address in **subnet 0**: **\_\_\_\_\_\_\_192.168.10.15\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
11. (Sub) Network address in **subnet 1**: **\_\_\_\_192.168.10.16\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
12. Last usable host address in **subnet 2**: **\_\_192.168.10.46\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Subnet | Subnet address | 1st Host address | Last Host address | Broadcast |
| 0 | 192.168.10.0 | 192.168.10.1 | 192.168.10.14 | 192.168.10.15 |
| 1 | 192.168.10.16 | 192.168.10.17 | 192.168.10.30 | 192.168.10.31 |
| 2 | 192.168.10.32 | 192.168.10.33 | 192.168.10.46 | 192.168.10.47 |
| 3 | 192.168.10.64 | 192.168.10.65 | 192.168.10.78 | 192.168.10.79 |
| 4 | 192.168.10.80 | 192.168.10.81 | 192.168.10.96 | 192.168.10.97 |
| 5 | 192.168.10.96 | 192.168.10.97 | 192.168.10.110 | 192.168.10.111 |

**Answer the following questions. Try to answer them without using tables to guide you:**

1. How many usable hosts per sub-network will you have using a /20 address? \_\_4094\_
2. What is the magic number in a /23 address? \_\_\_128\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. How many sub-networks can you have with a /18 prefix? 16382
4. How many hosts per network can you have with a subnet mask of 255.255.224.0? \_\_\_\_\_30\_\_\_\_\_\_