1. There are two virtual machines connected via vSwitch, the first one with 200.100.44.1/24 and the second one with 200.100.55.2/24. Assuming there is no firewall enabled between them that could prevent the communication, can they reach (ping) to each other? Explain your answer.

No, they cannot ping each other. The /24 subnet denotes that there is no subnet, so the first 3 octets must be matching for the two IP addresses to be on the same network and therefore be able to ping each other. However, the third octets do not match each other (44 != 55).

2. Class A private IP has the range of:
a. 10.0.0.0 – 10.255.255.255
b. 10.0.0.0 – 10.0.0.255
c. 1.0.0.0 – 126.255.255.255
d. 1.0.0.0 – 126.0.0.255

a. 10.0.0.0 – 10.255.255.255

3. Check the correct classification (if the IP address is a Network ID, Broadcast or a Valid IP) of the following IP addresses:

IP/CIDR	Network ID	Broadcast	Valid IP
192.168.1.65/26			Valid
200.168.1.127/25		Broadcast	
192.168.1.223/27		Broadcast	
192.168.1.223/28		Broadcast	
199.199.199.24/29	Network		

4. Which of the following is the mask for 200.100.1.1/30? Explain your answer.
a. 255.255.255.248
b. 255.255.255.252
c. 255.255.255.192

b. 255.255.255.252
6 bits were borrowed from the host (30 – 24 = 6), and the addition of those bits add up to 252 (128 + 64 + 32 + 16 + 8 + 4 = 252).

5. The mask 255.255.255.240 is equivalent to which CIDR? Explain your answer.
a. /27
b. /28
c. /29
d. /30

b. /28 because the addition of the first 4 bits equal 240 (128 + 64 + 32 + 16 = 240), so the base /24 + 4 borrowed bits equals /28 (24 + 4 = 28).

6. How many subnets exist in the CIDR /29? Show the steps used to get the answer

32 subnets
29 – 24 = 5 borrowed bits
Number of networks: 2^5 = 32 subnets

7. How many valid IP addresses (in a subnet) exist in the CIDR/30? Show the steps used to get the answer

2 valid IP addresses in a subnet
30 – 24 = 6 borrowed bits
Number of networks: 2^6 = 64
8 – 6 = 2 host bits
Number of IP address in each network: 2^2 = 4
Number of hosts in each network: 2^2 – 2 = 2

8. The mask 11111111.11111111.11111111.11100000 shows that there are:
a. 2 subnets
b. 4 subnets
c. 8 subnets
d. 16 subnets
How did you obtain the answer?

c. 8 subnets
The mask presented is /27, and 3 bits were borrowed from the host (27 – 24 = 3). So, the number of networks equals 8 (2^3 = 8).

9. Fill out the following table with the correct information for a class C.

CIDR	Mask	Number of subnets	Numbers of IP addresses per subnet	Number of valid IP addresses per subnet
/25	255.255.255.128	2	128	126
/26	255.255.255.192	4	64	62
/27	255.255.255.224	8	32	30
/28	255.255.255.240	16	16	14
/29	255.255.255.248	32	8	6
/30	255.255.255.252	64	4	2

10. Assuming two nodes are connected directly and no firewall is enabled, can the systems reach to each other with the command ping? Check the correct answers.

System A IP	System B IP	Yes	No
192.168.10.1/24	**192.168.10.252/24**	Yes	
172.16.1.100/16	**172.16.2.101/16**	Yes	
200.20.20.20/25	**200.20.20.23/25**	Yes	
192.168.1.1/24	**192.168.2.100/24**		No

11. Convert the following numbers from decimal to binary

a. 172

b. 192

c. 56

d. 200

a. 172 = 10101100
b. 192 = 11000000
c. 56 = 00111000
d. 200 = 11001000

12. Convert the following numbers from binary to decimal

a. 01011

b. 1111011

c. 1010010

d. 0100101

a. 01011 = 11
b. 1111011 = 123
c. 1010010 = 82
d. 0100101 = 37

13. Are the following IP addresses public, private or special? If special which one? If public/private which class?

a. 169.254.1.1

b. 168.0.0.1

c. 127.0.0.1

d. 200.2.2.2

e. 8.8.8.8

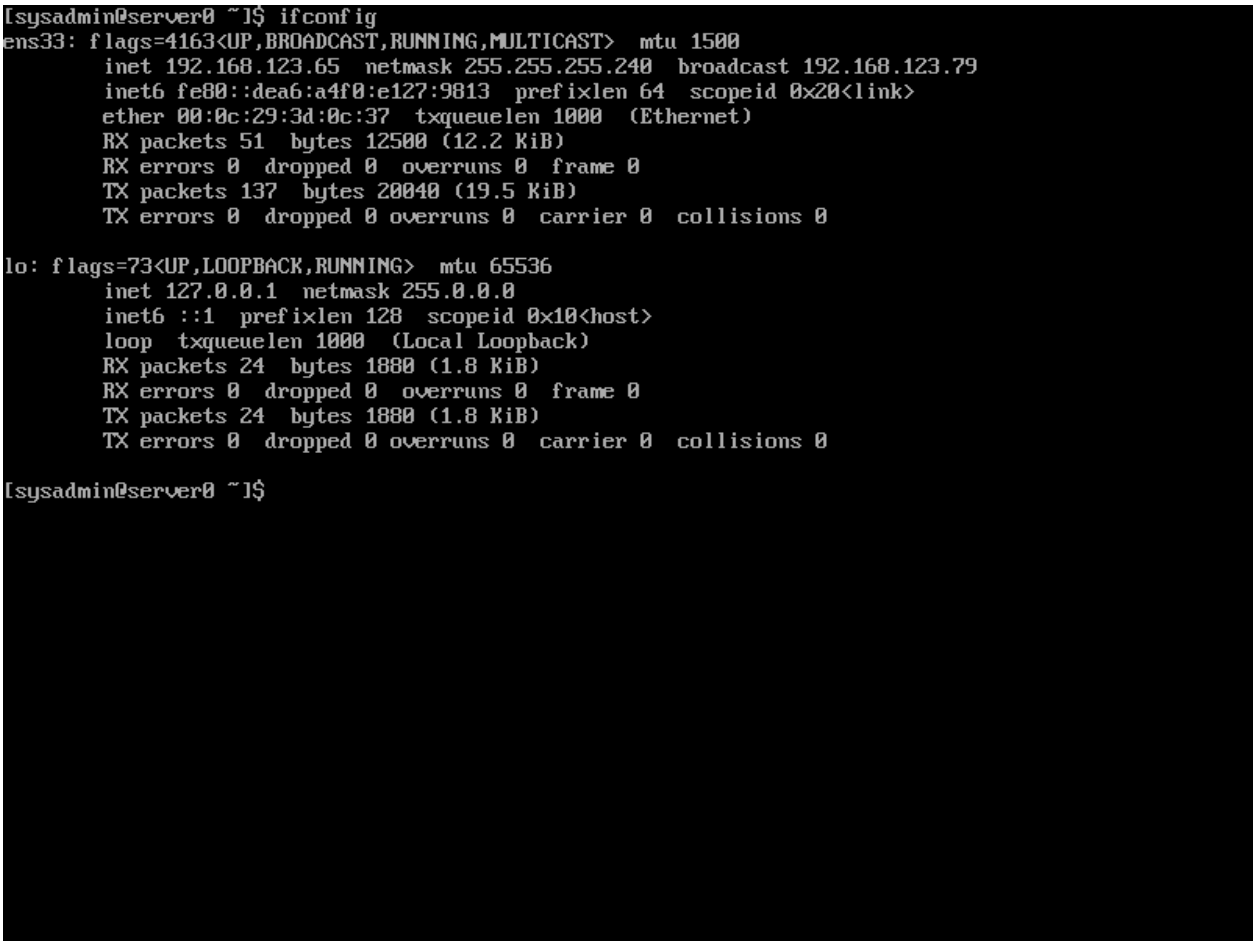
f. 172.30.1.1

g. 192.168.200.200

h. 169.254.169.254

a. 169.254.1.1 – special / APIPA
b. 168.0.0.1 – public / class B
c. 127.0.0.1 – special / Loopback purposes
d. 200.2.2.2 – public / class C
e. 8.8.8.8 – public / class A
f. 172.30.1.1 – private / class B
g. 192.168.200.200 – private / class C
h. 169.254.169.254 – special / APIPA

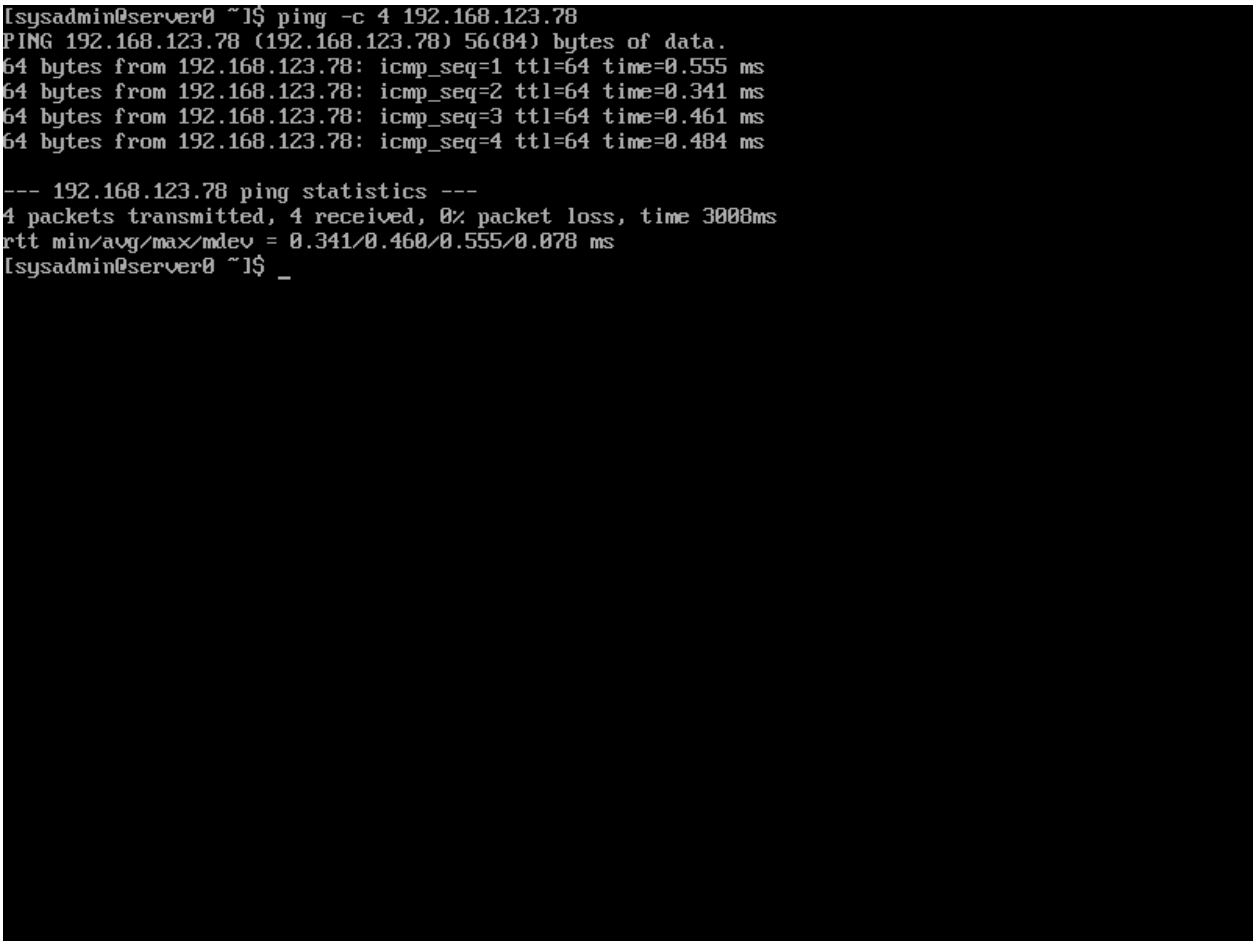
14. Using the 5th subnet of the 192.168.123.0/28, assign the first valid IP and the last valid IP of that subnet to your CentOS systems.
Take four screenshots:
a. the network configuration for both systems
b. the execution of the ping command for both systems
Add the screenshots for this question to your report, along with the answers of the previous questions.

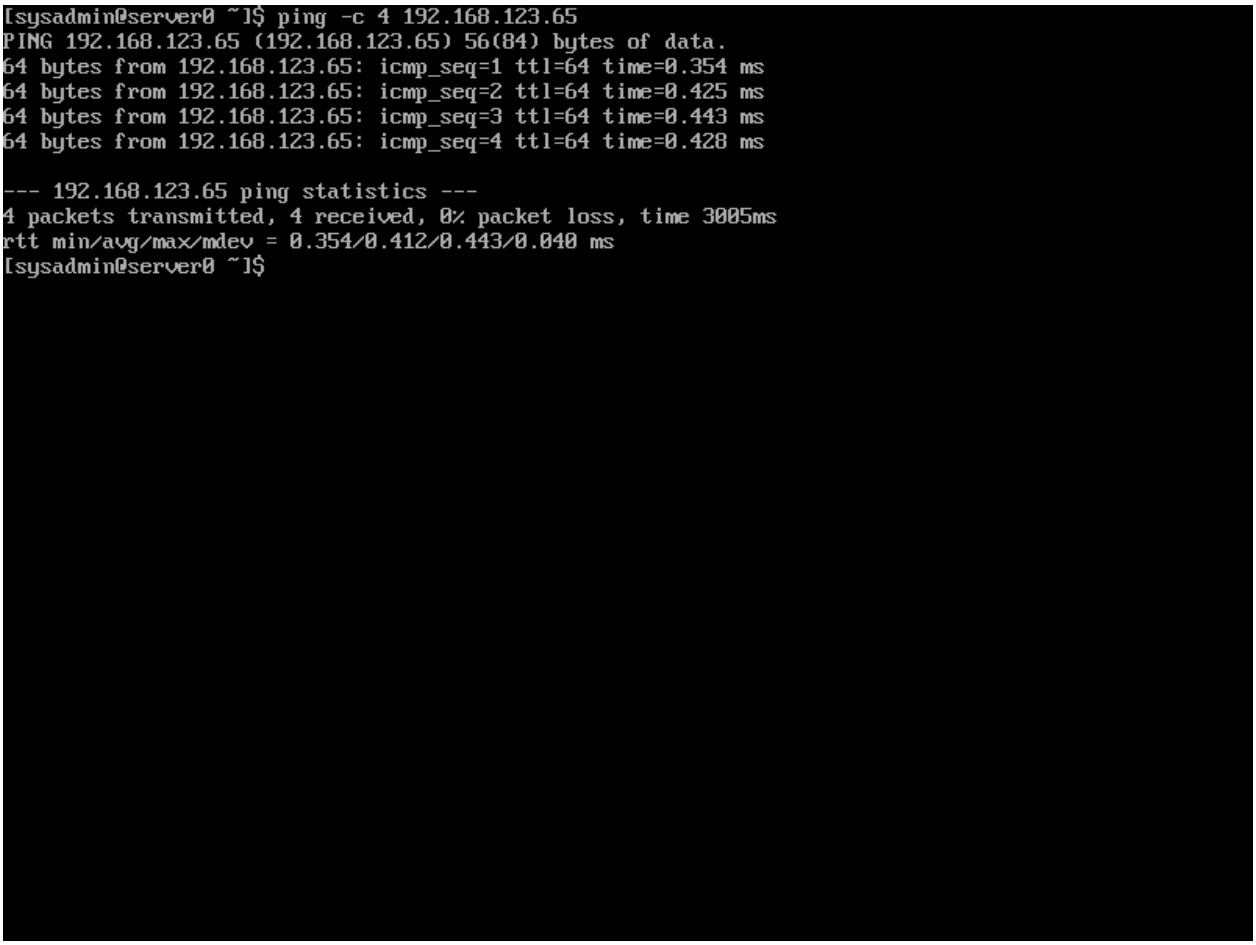


```
[sysadmin@server0 ~]$ ifconfig
ens33: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet 192.168.123.78  netmask 255.255.255.240  broadcast 192.168.123.79
        inet6 fe80::dea6:a4f0:e127:9813  prefixlen 64  scopeid 0x20<link>
        ether 00:0c:29:38:da:a4  txqueuelen 1000  (Ethernet)
        RX packets 5  bytes 352 (352.0 B)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 34  bytes 2576 (2.5 KiB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

lo: flags=73<UP,LOOPBACK,RUNNING>  mtu 65536
        inet 127.0.0.1  netmask 255.0.0.0
        inet6 ::1  prefixlen 128  scopeid 0x10<host>
        loop  txqueuelen 1000  (Local Loopback)
        RX packets 8  bytes 536 (536.0 B)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 8  bytes 536 (536.0 B)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

[sysadmin@server0 ~]$ _
```


[sysadmin@server0 ~]$ ping -c 4 192.168.123.78
PING 192.168.123.78 (192.168.123.78) 56(84) bytes of data.
64 bytes from 192.168.123.78: icmp_seq=1 ttl=64 time=0.555 ms
64 bytes from 192.168.123.78: icmp_seq=2 ttl=64 time=0.341 ms
64 bytes from 192.168.123.78: icmp_seq=3 ttl=64 time=0.461 ms
64 bytes from 192.168.123.78: icmp_seq=4 ttl=64 time=0.484 ms
--- 192.168.123.78 ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3008ms
rtt min/avg/max/mdev = 0.341/0.460/0.555/0.078 ms
[sysadmin@server0 ~]$ _


[sysadmin@server0 ~]$ ping -c 4 192.168.123.65
PING 192.168.123.65 (192.168.123.65) 56(84) bytes of data.
64 bytes from 192.168.123.65: icmp_seq=1 ttl=64 time=0.354 ms
64 bytes from 192.168.123.65: icmp_seq=2 ttl=64 time=0.425 ms
64 bytes from 192.168.123.65: icmp_seq=3 ttl=64 time=0.443 ms
64 bytes from 192.168.123.65: icmp_seq=4 ttl=64 time=0.428 ms
--- 192.168.123.65 ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3005ms
rtt min/avg/max/mdev = 0.354/0.412/0.443/0.040 ms
[sysadmin@server0 ~]$