

Each question worth 2 points:

Tip: When not logged in as root, you can still use many of the network commands but you must preface them with `/sbin/` because you don't have root's environment. For example, typing `ifconfig` will result in a "command not found" error. Use `/sbin/ifconfig` instead.

The first three questions are all related. They refer to the same computer and NIC drivers.

1. Use Putty or ssh to login as cis192 on 172.30.1.20. This computer may have one or more Ethernet controllers (NICs). Determine the number of NICs installed. For every NIC found, identify the NIC vendor and model:

Number of NICs: _____

NIC 1 vendor and model: _____

NIC 2 vendor and model (if present): _____

NIC 3 vendor and model (if present): _____

2. Based on the Linux Ethernet Howto at <http://tldp.org/HOWTO/Ethernet-HOWTO.html> and matching NIC 1 (above) to the *closest* device listed, what driver should be used for NIC 1, where is this driver located on the computer, and how would you check to see if this specific driver (not all drivers) has been loaded?

Driver name: _____

Absolute pathname of the driver: _____

Command to show specific loaded driver: _____

(hint: use this command to verify you have indeed identified the correct driver name)

3. NIC drivers are dynamic kernel modules. To unload and reload the driver (above) what specific commands would you use?

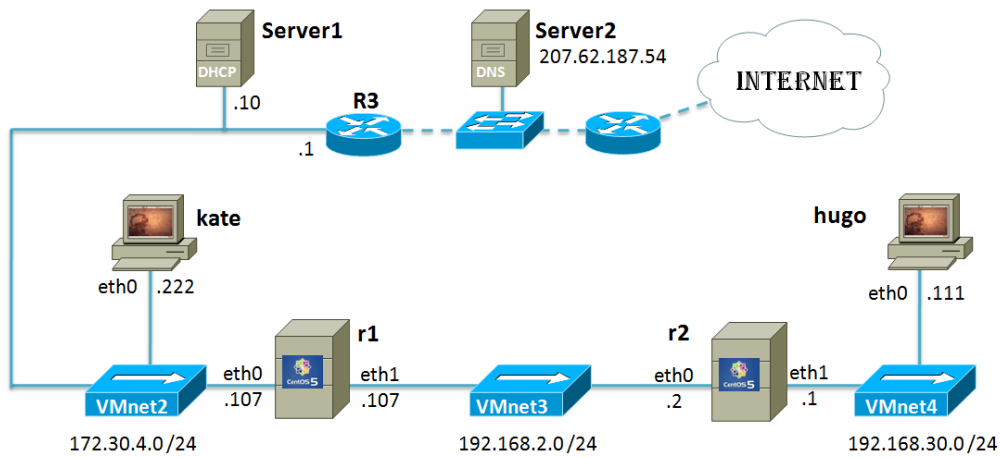
To unload the driver: _____

To load the driver: _____

4. Given an IP address of 15.87.147.132 and a network mask of 255.255.248.0, what is the network (using /xx notation) and broadcast address?

Network: _____

Broadcast address: _____



5. On Linux router **r1**, what complete command adds a static route to enable sending packets to hosts on VMnet4?

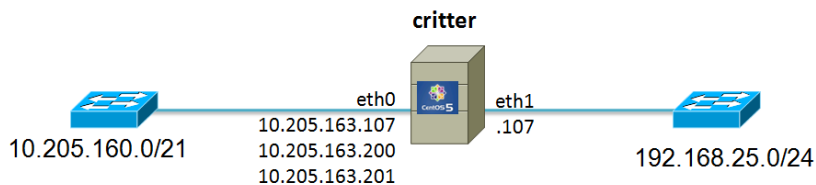
6. Given the following:

```
[root@lilly ~]# ping google.com
PING google.com (209.85.171.100) 56(84) bytes of data:
64 bytes from cg-in-f100.google.com (209.85.171.100): icmp_seq=1 ttl=243 time=23.4 ms
64 bytes from cg-in-f100.google.com (209.85.171.100): icmp_seq=2 ttl=243 time=22.0 ms

--- google.com ping statistics ---
2 packets transmitted, 2 received, 0% packet loss, time 1001ms
rtt min/avg/max/mdev = 22.013/22.716/23.420/0.719 ms
[root@lilly ~]# arp -n
Address          HWtype  HWaddress          Flags Mask          Iface
16.25.93.1       ether   00:1B:3F:30:16:94  C                   eth0
[root@lilly ~]#
```

What is the likely default gateway IP address on Lilly?

- 7.



What commands would you use to configure the eth0 IP addresses on Critter that would stay in effect till the next reboot?

8. Which of the following are routing protocols?

- OSPF
 - RIP
 - Ethernet
 - IP
 - ARP
-

9. Using this routing table:

```
[root@elrond ~]# route -n
Kernel IP routing table
Destination      Gateway          Genmask          Flags Metric Ref    Use Iface
192.168.2.8      0.0.0.0         255.255.255.252 U        0     0      0 eth1
192.168.2.0      0.0.0.0         255.255.255.252 U        0     0      0 eth0
192.168.2.4      192.168.2.2    255.255.255.252 UG       2     0      0 eth0
172.30.4.0       0.0.0.0         255.255.255.0   U        0     0      0 eth2
10.10.10.0       192.168.2.2    255.255.255.0   UG       2     0      0 eth0
169.254.0.0      0.0.0.0         255.255.0.0     U        0     0      0 eth2
0.0.0.0          172.30.4.1     0.0.0.0         UG       0     0      0 eth2
[root@elrond ~]#
```

What would happen with a outgoing packet having an destination IP address of 192.168.2.13?

10. Given the following ping test result, what is the likely problem and how would you fix it?

```
[root@elrond ~]# ping 192.168.10.1
PING 192.168.10.1 (192.168.10.1) 56(84) bytes of data.

--- 192.168.10.1 ping statistics ---
16 packets transmitted, 0 received, 100% packet loss, time 15017ms

[root@elrond ~]#
```

11. At what OSI layer are source and destination ports used?

12. Two students are working in the CIS lab at different stations. They both are using the bridged Frodo VM and with correct IP, mask, DNS, and default gateway settings handed out by the DHCP server. Using their Frodo, they both can ping the lab router address 172.30.4.1 as shown below. However only Student 2 can ping Internet addresses.

Student 1

```
[root@frodo:~# ping -c1 172.30.4.1
PING 172.30.4.1 (172.30.4.1) 56(84) bytes of data.
64 bytes from 172.30.4.1: icmp_seq=1 ttl=64 time=1.32 ms

--- 172.30.4.1 ping statistics ---
1 packets transmitted, 1 received, 0% packet loss, time 0ms
rtt min/avg/max/mdev = 1.329/1.329/1.329/0.000 ms
```

```
[root@frodo:~# arp -n
Address                HWtype  HWaddress          Flags Mask            Iface
172.30.4.1             ether   00:0c:29:bf:e4:f9  C                     eth0
```

Student 2

```
root@frodo:~# ping -c1 172.30.4.1
PING 172.30.4.1 (172.30.4.1) 56(84) bytes of data.
64 bytes from 172.30.4.1: icmp_seq=1 ttl=64 time=2.41 ms

--- 172.30.4.1 ping statistics ---
1 packets transmitted, 1 received, 0% packet loss, time 0ms
rtt min/avg/max/mdev = 2.415/2.415/2.415/0.000 ms
```

```
root@frodo:~# arp -n
Address                HWtype  HWaddress          Flags Mask            Iface
172.30.4.1             ether   00:B0:64:53:42:01  C                     eth0
root@frodo:~#
```

You only have the troubleshooting information above to diagnose the problem. What is happening on the Lab network and what is the solution to fix it?

13. With respect to RFC 1058, what is this RFC about and what is the second word in section 2.2.?

RFC 1058 is about: _____

2nd word in section 2.2: _____

14. Given:

```
[root@elrond ~]# ifconfig eth0
eth0      Link encap:Ethernet  HWaddr 00:0C:29:4E:21:9B
          inet addr:192.168.2.1  Bcast:192.168.2.3  Mask:255.255.255.252
          inet6 addr: fe80::20c:29ff:fe4e:219b/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:28589 errors:0 dropped:0 overruns:0 frame:0
          TX packets:28949 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:2622712 (2.5 MiB)  TX bytes:3198137 (3.0 MiB)
          Interrupt:177 Base address:0x1400

[root@elrond ~]#
```

What is the IP and MAC address for this interface?

IP: _____

MAC: _____

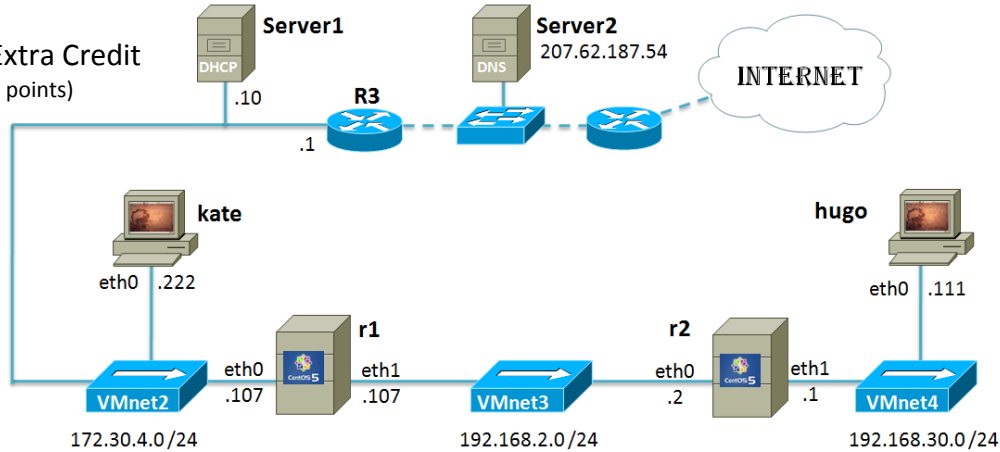
15. Given this routing table

```
[root@legolas ~]# route -n
Kernel IP routing table
Destination      Gateway          Genmask          Flags Metric Ref    Use Iface
192.168.2.8      192.168.2.1     255.255.255.252 UG    2     0     0   eth0
192.168.2.0      0.0.0.0         255.255.255.252 U     0     0     0   eth0
192.168.2.4      0.0.0.0         255.255.255.252 U     0     0     0   eth1
172.30.4.0       192.168.2.1     255.255.255.0   UG    2     0     0   eth0
10.10.10.0       0.0.0.0         255.255.255.0   U     0     0     0   eth2
169.254.0.0     0.0.0.0         255.255.0.0     U     0     0     0   eth2
0.0.0.0         192.168.2.1     0.0.0.0         UG    0     0     0   eth0

[root@legolas ~]#
```

What networks (use the /xx notation) is this Linux router directly connected to?

16. Extra Credit
(2 points)



In the network above, **hugo** fails to ping **kate** getting:

```
root@hugo:~# ping kate
PING kate (172.30.4.222) 56(84) bytes of data:
^C
--- kate ping statistics ---
12 packets transmitted, 0 received, 100% packet loss, time 11014ms
root@hugo:~#
```

The routing tables are as follows:

```
root@hugo:~# route -n
Kernel IP routing table
Destination      Gateway          Genmask         Flags Metric Ref    Use Iface
192.168.30.0    0.0.0.0         255.255.255.0  U        0      0      0 eth0
169.254.0.0     0.0.0.0         255.255.0.0    U        1000   0      0 eth0
0.0.0.0         192.168.30.1   0.0.0.0        UG       100    0      0 eth0
root@hugo:~#

[root@r2 ~]# route -n
Kernel IP routing table
Destination      Gateway          Genmask         Flags Metric Ref    Use Iface
192.168.2.0     0.0.0.0         255.255.255.0  U        0      0      0 eth0
192.168.30.0   0.0.0.0         255.255.255.0  U        0      0      0 eth1
169.254.0.0    0.0.0.0         255.255.0.0    U        0      0      0 eth1
0.0.0.0        192.168.2.107  0.0.0.0        UG       0      0      0 eth0
[root@r2 ~]#

[root@r1 ~]# route -n
Kernel IP routing table
Destination      Gateway          Genmask         Flags Metric Ref    Use Iface
172.30.4.0      0.0.0.0         255.255.255.0  U        0      0      0 eth0
192.168.2.0    0.0.0.0         255.255.255.0  U        0      0      0 eth1
192.168.30.0   192.168.2.2    255.255.255.0  UG       0      0      0 eth1
169.254.0.0    0.0.0.0         255.255.0.0    U        0      0      0 eth1
0.0.0.0        172.30.4.1     0.0.0.0        UG       0      0      0 eth0
[root@r1 ~]#

root@kate:~# route -n
Kernel IP routing table
Destination      Gateway          Genmask         Flags Metric Ref    Use Iface
172.30.4.0      0.0.0.0         255.255.255.0  U        0      0      0 eth0
192.168.3.0    172.30.4.107   255.255.255.0  UG       0      0      0 eth0
192.168.2.0    172.30.4.107   255.255.255.0  UG       0      0      0 eth0
169.254.0.0    0.0.0.0         255.255.0.0    U        1000   0      0 eth0
0.0.0.0        172.30.4.1     0.0.0.0        UG       100    0      0 eth0
root@kate:~#
```

What is happening and how do you fix it?
