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CCENT Study Guide

Chapter 5

VLSMs, Summarization and Troubleshooting TCP/IP

Chapter 5 Objectives

The CCENT Topics Covered in this chapter include:

Network Fundamentals

1.7 Apply troubleshooting methodologies to resolve problems.

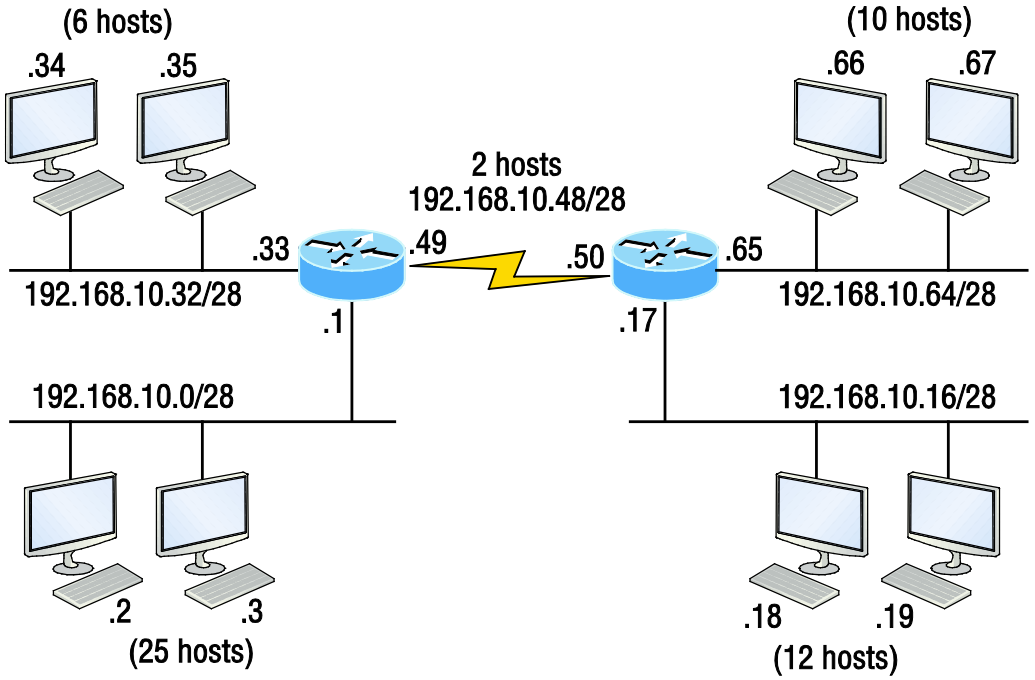
1.7.a Perform fault isolation and document.

1.7.b Resolve or escalate.

1.7.c Verify and monitor resolution.

1.8 Configure, verify, and troubleshoot IPv4 addressing and subnetting.

Figure 5.1: Typical classful network

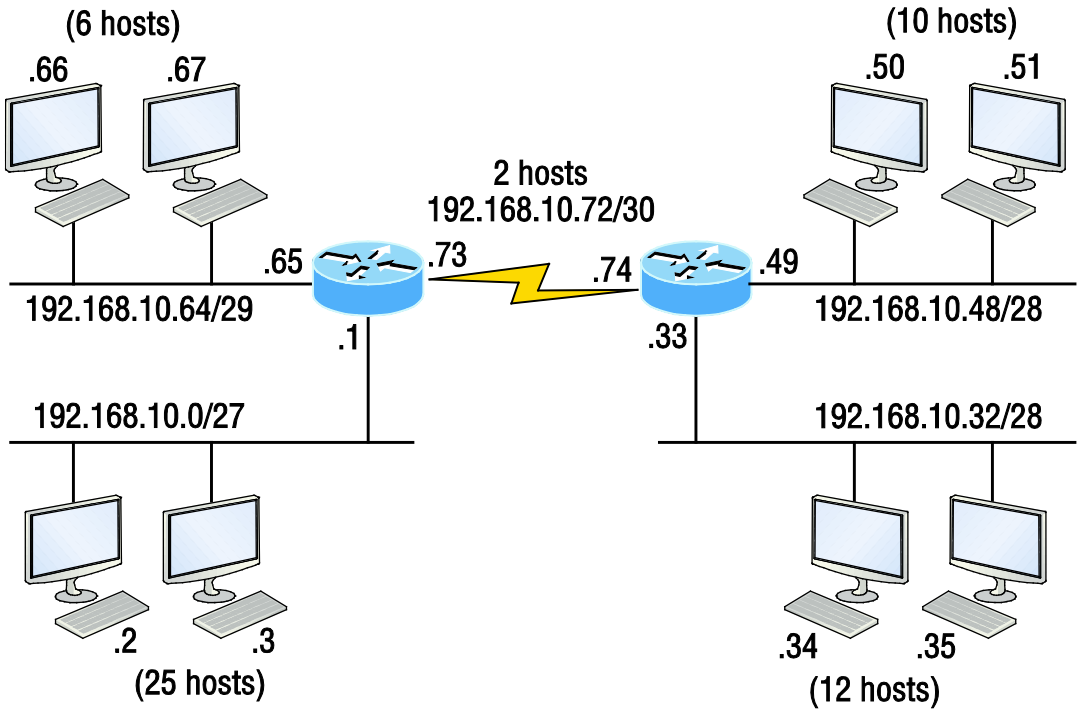


Looking at Figure 5.1, you can see that there are two routers, each with two LANs and connected together with a WAN serial link. In a typical classful network design that's running RIP, you could subnet a network like this:

192.168.10.0 = Network.

255.255.255.240 (/28) = Mask.

Figure 5.2: Classless network design



Now remember that we can use different size masks on each router interface. If we use a /30 on our WAN links and a /27, /28, and /29 on our LANs, we'll get 2 hosts per WAN interface and 30, 14, and 6 hosts per LAN interface.

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Figure 5.3: The VLSM table

Subnet	Mask	Subnets	Hosts	Block
/25	128	2	126	128
/26	192	4	62	64
/27	224	8	30	32
/28	240	16	14	16
/29	248	32	6	8
/30	252	64	2	4

Network	Hosts	Block	Subnet	Mask
A				
B				
C				
D				
E				
F				
G				
H				
I				
J				
K				
L				

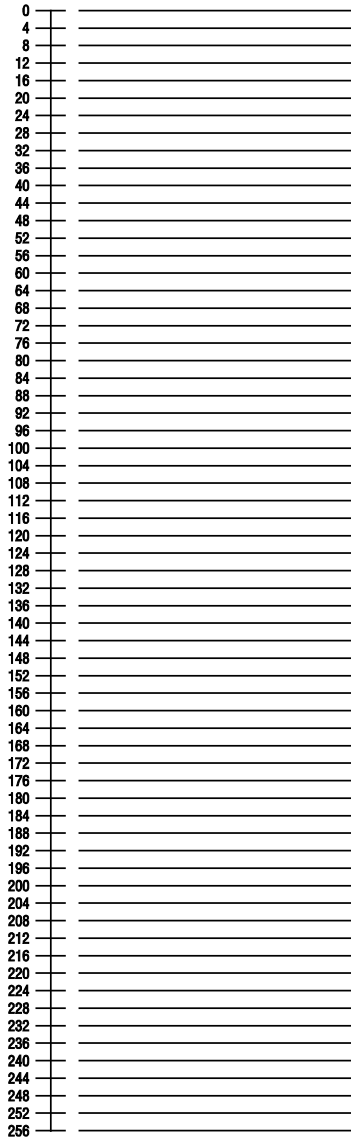

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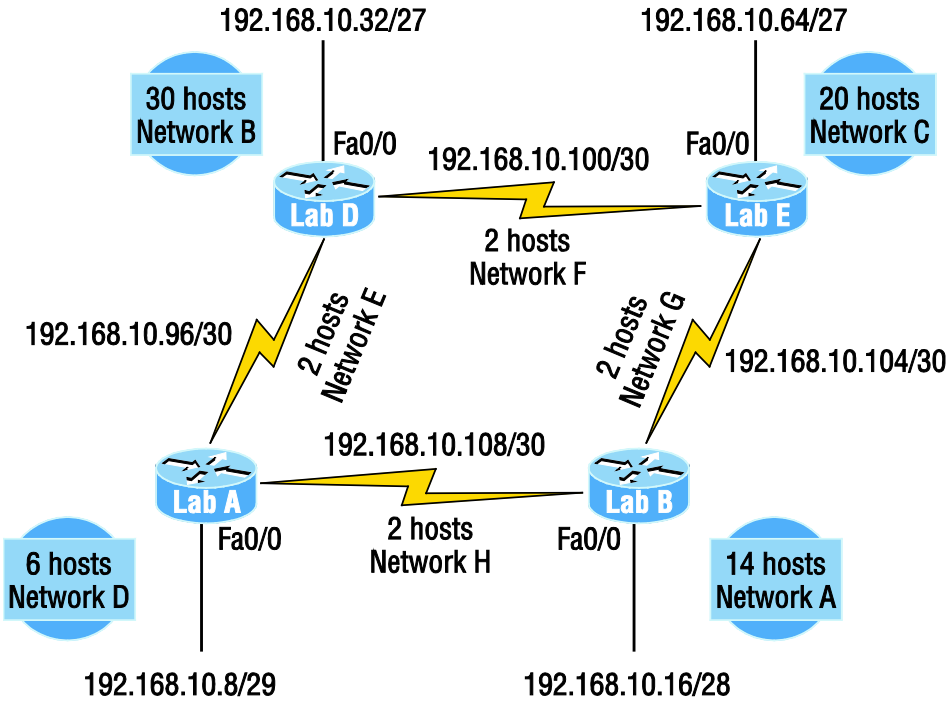
Figure 5.4: VLSM network example 1



In Figure 5.4, we have four WAN links and four LANs connected together, so we need to create a VLSM network that will save address space. Looks like we have two block sizes of 32, a block size of 16, and a block size of 8, and our WANs each have a block size of 4.

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Figure 5.5: VLSM table example 1

Subnet	Mask	Subnets	Hosts	Block
/25	128	2	126	128
/26	192	4	62	64
/27	224	8	30	32
/28	240	16	14	16
/29	248	32	6	8
/30	252	64	2	4

Network	Hosts	Block	Subnet	Mask
A	12	16	/28	240
B	20	32	/27	224
C	25	32	/27	224
D	4	8	/29	248
E	2	4	/30	252
F	2	4	/30	252
G	2	4	/30	252
H	2	4	/30	252

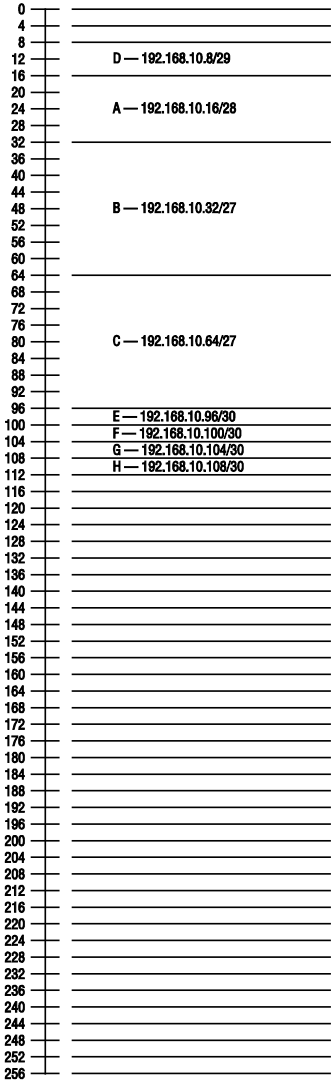

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Figure 5.6: VLSM network example 2

A: /27
B: /28
C: /28
D: /30
E: /30
F: /30
G: /28
H: /26
I: /28
J: /26
K: /28

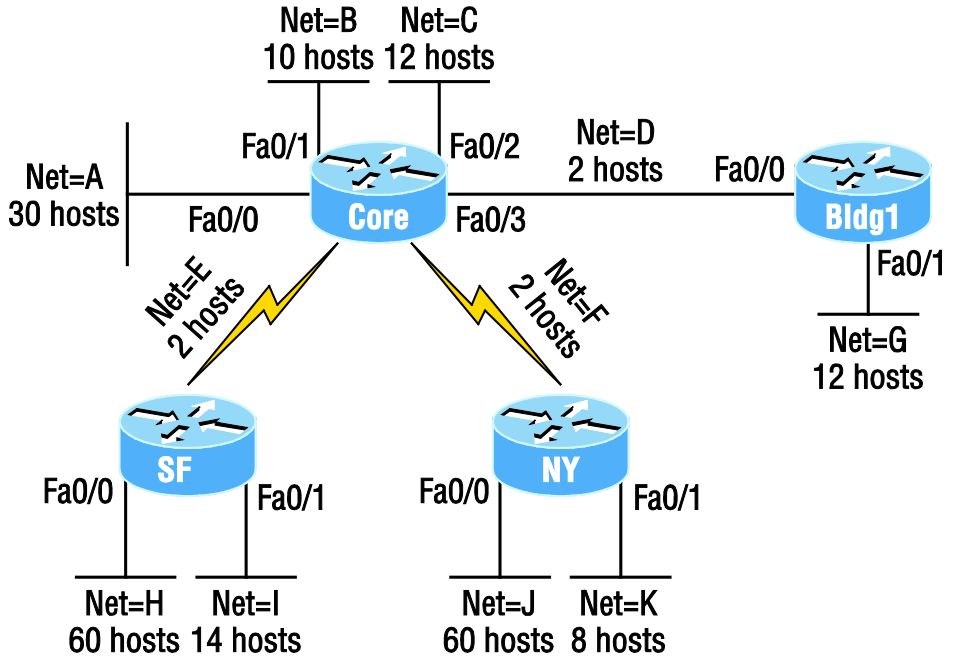


Figure 5.6 shows a network with 11 networks, two block sizes of 64, one of 32, five of 16, and three of 4.

Figure 5.7: VLSM table example 2

Subnet	Mask	Subnets	Hosts	Block
/25	128	2	126	128
/26	192	4	62	64
/27	224	8	30	32
/28	240	16	14	16
/29	248	32	6	8
/30	252	64	2	4

Network	Hosts	Block	Subnet	Mask
A				
B				
C				
D				
E				
F				
G				
H				
I				
J				
K				

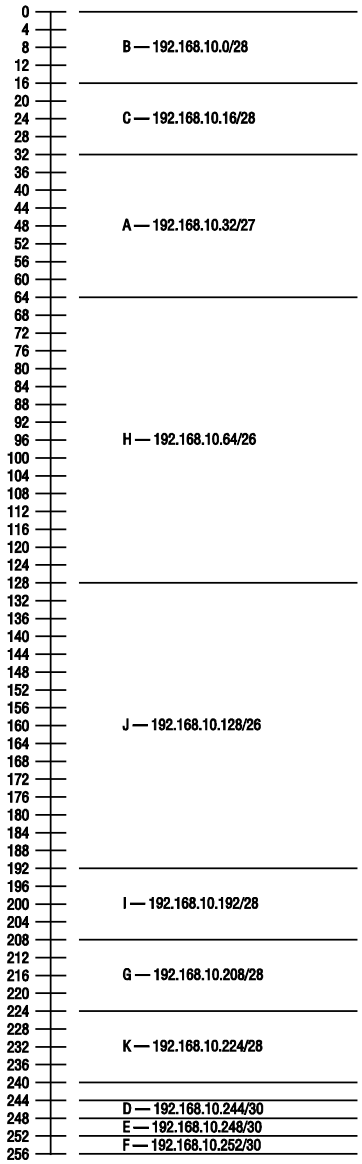


Figure 5.12: Summary address used in an internetwork

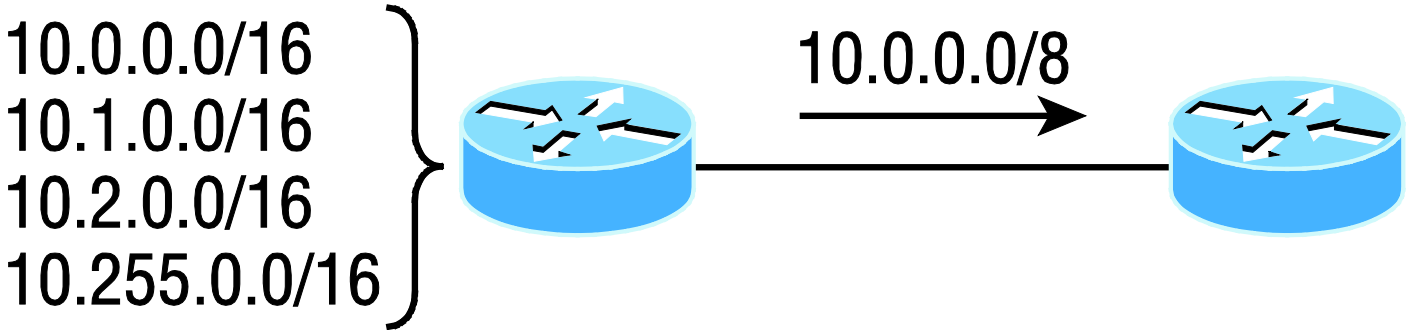
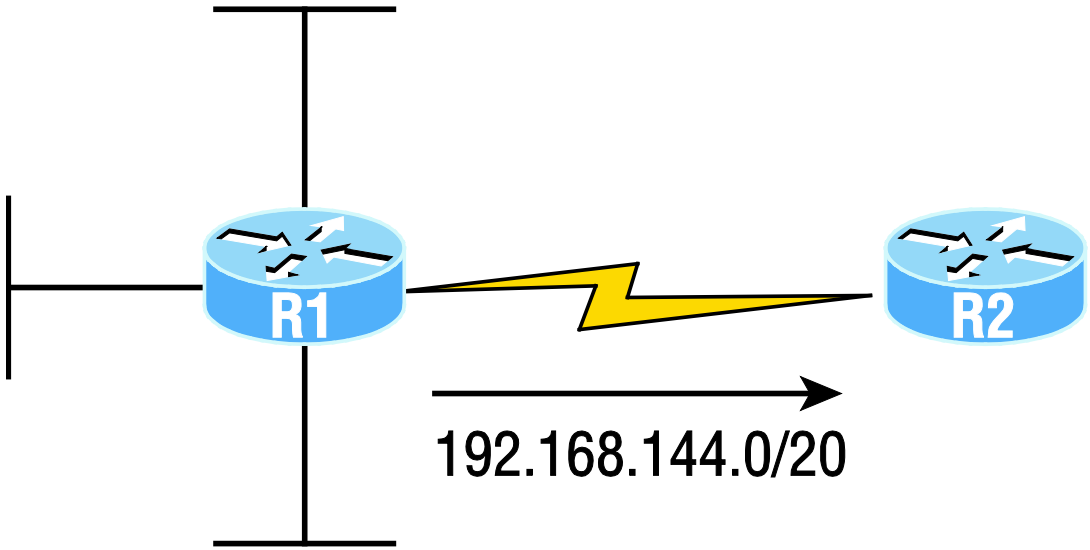


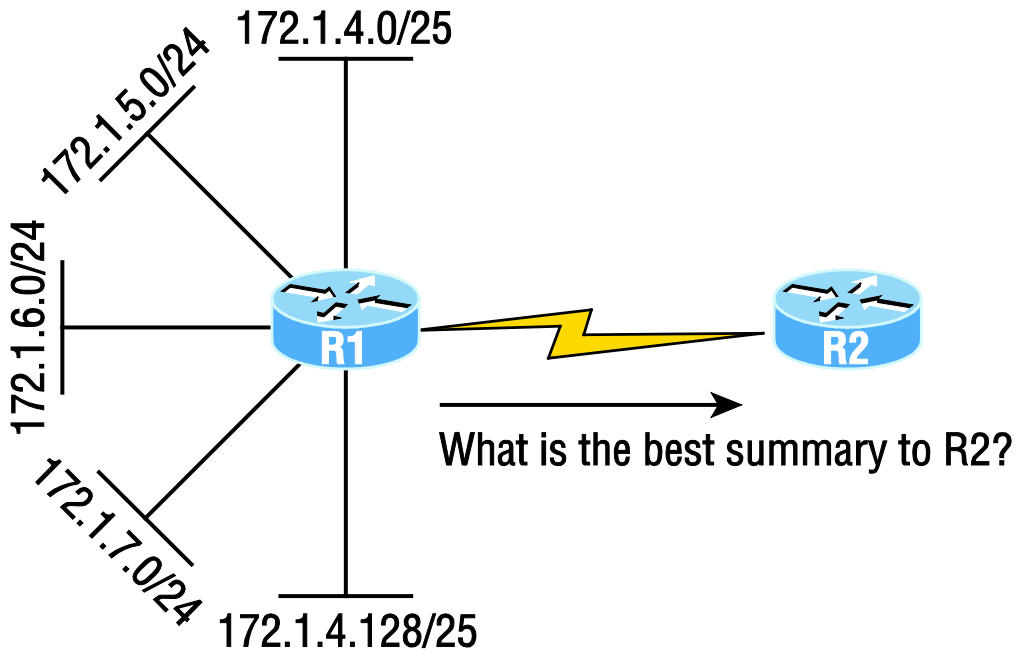
Figure 5.12 shows how a summary address would be used in an internetwork.

Figure 5.13: Summarization example 4



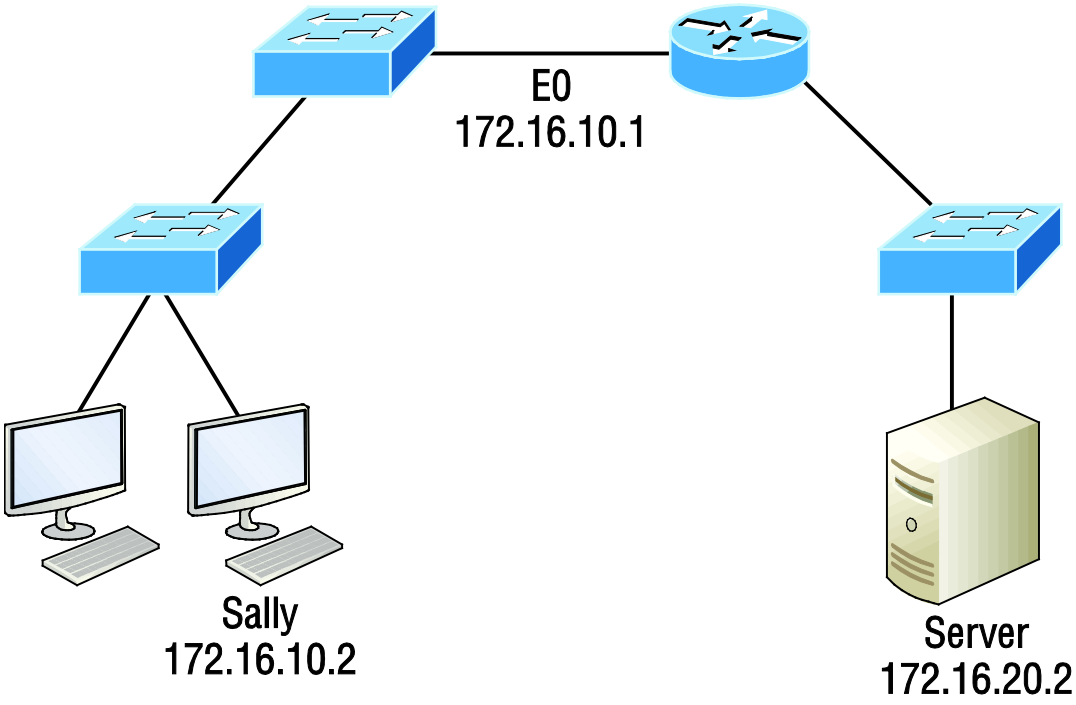
The Ethernet networks connected to router R1 are being summarized to R2 as 192.168.144.0/20. Which IP addresses will R2 forward to R1 according to this summary?

Figure 5.14: Summarization example 5



Okay, last one. In Figure 5.14, there are five networks connected to router R1. What's the best summary address to R2?

Figure 5.15: Basic IP troubleshooting



Here are the four troubleshooting steps Cisco recommends:

- 1. Open a Command window and ping 127.0.0.1. This is the diagnostic, or loopback, address, and if you get a successful ping, your IP stack is considered initialized. If it fails, then you have an IP stack failure and need to reinstall TCP/IP on the host.
- 2. From the Command window, ping the IP address of the local host. If that's successful, your network interface card (NIC) is functioning. If it fails, there is a problem with the NIC. Success here doesn't just mean that a cable is plugged into the NIC, only that the IP protocol stack on the host can communicate to the NIC via the LAN driver.
- 3. From the CMD window, ping the default gateway (router). If the ping works, it means that the NIC is plugged into the network and can communicate on the local network. If it fails, you have a local physical network problem that could be anywhere from the NIC to the router.
- 4. If steps 1 through 3 were successful, try to ping the remote server. If that works, then you know that you have IP communication between the local host and the remote server. You also know that the remote physical network is working.

Written Labs and Review Questions

- Read through the Exam Essentials section together in class.
- Open your books and go through all the written labs and the review questions.
- Review the answers in class.