

1. **(KR, Chapter 4, P12)** Consider a datagram network using 8-bit host addresses. Suppose a router uses longest prefix matching and has the following forwarding table:

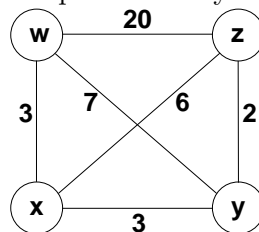
Prefix Match	Interface
11	0
101	1
100	2
otherwise	3

For each of the four interfaces, give the associated range of destination host addresses and the number of addresses in the range.

2. **(KR, Chapter 4, P16)** Consider a subnet with prefix 192.168.56.128/26. Give the range of IP addresses (of form xxx.xxx.xxx.xxx) that can be assigned to this network.

Suppose an ISP owns the block of addresses of the form 192.168.56.128/26. Suppose it wants to create four subnets from this block, with each block having the same number of IP addresses. What are the prefixes (of form a.b.c.d/x) for the four subnets?

3. **(KR, Chapter 4, P23)** In this problem we will explore the impact of NATs on P2P application. Suppose a peer with username Arnold discovers through querying that a peer with username Bernard has a file it wants to download. Also suppose that both Arnold and Bernard are behind NATs. Try to devise a technique that will allow Arnold to establish a TCP connection with Bernard without application-specific NAT configuration. If you have difficulty devising such a technique, discuss why.
4. **(CS2105 Final Exam, April 2006)** The following diagram shows a simple network topology with 4 nodes. The links in the diagram are labeled with the cost of each link. The nodes run distance vector routing protocol. The protocol has terminated, and each node knows the cost of the minimum cost path to every other node.



- (a) The following table shows an incomplete routing table at node  $x$ . Fill in the missing distance vector for  $x$  and  $z$ .

	cost to $w$	cost to $x$	cost to $y$	cost to $z$
from $x$		0		
from $y$			0	
from $z$				0

- (b) Now, suppose the cost of the link between  $x$  and  $w$  increases from 3 to 20. Node  $x$  detects the changes in the cost. Before  $x$  receives any new distance vector from its neighbors, triggered by these changes,  $x$  recomputes its new minimum-cost path to  $w$ ,  $y$ , and  $z$ , and updates its distance vector.

Suppose that poisoned reverse is NOT used. What is the new computed cost from  $x$  to  $w$ ?

- (c) Suppose that poisoned reverse is used. What is the new computed cost from  $x$  to  $w$ ?