Chris Grimes
CS 35201
Homework 5
1. Consider the network of Fig. 5-12(a). Distance vector routing is used, and the following
vectors have just come in to router C: from B: (5, 0, 8, 12, 6, 2); from D: (16, 12, 6, 0, 9, 10); and
from E: (7, 6, 3, 9, 0, 4). The cost of the links from C to B, D, and E, are 6, 3, and 5, respectively.
What is C's new routing table? Give both the outgoing line to use and the cost.

Problem 6, page 490 of the text

	B	D	E
A	11	19	12
B	6	15	11
D	18	3	14
E	12	12	5
F	8	13	9

	Distance, Next Stop
A	11, B
B	6, B
D	3, D
E	5, E
F	8, B

2. If costs are recorded as 8-bit numbers in a 50-router network, and distance vectors are
exchanged twice a second, how much bandwidth per (full-duplex) line is chewed up by the
distributed routing algorithm? Assume that each router has three lines to other routers.

Problem 18, page 491 of the text

Routing Table = 8 bit * 50 = 400 bits

Update twice a second= 400 bits*2= 800 bits per second

3. A router can process 2 million packets/sec. The load offered to it is 1.5 million packets/ sec on
average. If a route from source to destination contains 10 routers, how much time is spent being
queued and serviced by the router? Hint; queuing delay at each node is $1/(\mu - \lambda)$

Problem 28, page 491 of the text

With μ= 2 million and λ= 1.5 million,

the queuing delay at each node = 1/(2,000,000-1,500,000)= 1/500,000= 2 μ seconds

2 μ*10 nodes= 20 μ seconds

Chris Grimes
CS 35201
Homework 5
4. A large number of consecutive IP addresses are available starting at 198.16.0.0. Suppose that four organizations, A, B, C, and D, request 4000, 2000, 4000, and 8000 addresses, respectively, and in that order. For each of these, give the first IP address assigned, the last IP address assigned, and the mask in the w.x.y.z/s notation.

Problem 30, page 492 of the text

Organization A:

Network mask should be: 198.16.00000000/20 or 198.16.0.0/20

First IP address: 198.16.0.1

Last IP address: 198.16.00001111.10100001 or 198.16.15.161

Organization B:

Network mask should be: 198.16.00010000/21 or 198.16.16.0/21

First IP address: 198.16.16.1

Last IP address: 198.16.00010111.11100001 or 198.16.23.225

Organization C:

Network mask should be: 198.16.00110000/20 or 198.16.48.0/20

First IP address: 198.16.48.1

Last IP address: 198.16.00111111.10100001 or 198.16.63.161

Organization D:

Network mask should be: 198.16.01100000/19 or 198.16.96.0/19

First IP address: 198.16.96.1

Last IP address: 198.16.01111111.01000001 or 198.16.127.65

5. A router has the following (CIDR) entries in its routing table:

Address/mask Next   hop

135.46.56.0/22   Interface 0

135.46.60.0/22   Interface 1

Chris Grimes
CS 35201
Homework 5
192.53.40.0/23   Router 1

default   Router 2

For each of the following IP addresses, what does the router do if a packet with that address arrives?

(a) 135.46.63.10

Using the first 22 bits of 135.46.63.10 we get 135.46.60.0

Since this new address matches the second row of the routing table the packet will be forwarded to Interface 1

(b) 135.46.57.14

Using only the first 22 bits of 135.46.57.14 we get 135.45.56.0 which matches the first row of the routing table. So, the packet will be forwarded to Interface 0

(c) 135.46.52.2

Using the first 22 bits of 135.46.52.2 we get 135.45.52.0 which doesn't match any of the first three rows of the routing table. So, the packet will be forwarded to default which is Router 2.

(d) 192.53.40.7

Using the first 23 bits of 192.53.40.7 we get 192.53.40.0 which matches the address in the address in the third row. So, the packet will be forwarded to Router 1.

(e) 192.53.56.7

Using the first 23 bits of 192.53.56.7 we get 192.53.56.0 which doesn't match any of the first three rows of the routing table. So, the packet will be forwarded to default which is Router 2.