Homework #4	CS 372	Rhea Mae Edwards

80/100

Review Questions

R3.) The Difference Between Routing and Forwarding:

5/5

- Routing determines the route taken by packets from a source to a destination ✓
- Forwarding is the movement of packets from router's input to the appropriate router output. ✓

- Overall, the difference between routing and forwarding is like the overall picture/trip of a traveling packet is the routing process, and forwarding just represents the movement through a single link/part of the trip.

R8.) Three Types of Switching Fabrics:

5/5

1) Memory: usually used in traditional computers with switching under direct control of the CPU, where packets are copied to the system's memory, and that the speed is limited by the memory's bandwidth of 2 bus crossings per datagram

2) Bus: A datagram travels from an input port memory to an output port memory by a "shared bus". There's also a bus contention where the switching speed is limited by the bus bandwidth.

3) Crossbar: Developed to overcome bus bandwidth limitations that is also made to connect processors in a multiprocessor, by fragmenting a datagram in fixed length cells, that are then switch cells through the fabric with more advanced networks

Switching via an interconnected network (crossbar) can send multiple packets across the fabric in parallel, where more sophisticated interconnection networks use multiple stages of switching elements to allow packets from different input ports to proceed towards the same output port at the same time through the switching fabric. ✓

R12.) Yes, routers have IP addresses, and they have an address for each interface that the router has, so as many interfaces that the router has, is the number of IP addresses it has. ✓

5/5

R17.) There's a field within the data section of an IP datagram which has 8-bits that contains information for the network layer in Host B to read to let it know whether it should pass the segment (payload of the datagram) to TCP rather than to UDP or to something else ✓

5/5

Homework #4	CS 372	Rhea Mae Edwards

Problems

P11) 5/10

Prefix Match	Interface
00	0
010	1
011	2
10	2
11	3

- For each of the four interfaces, associated range of destination host addresses and number of addresses in the range
- 8-Bit Host Addresses

-5

Interface	Range of Destination Host Addresses	
0	00[000000] through 00[111111]	$2^6 = 64$
1	010[00000] through 010[11111]	$2^5 = 32$
2	01100000 through 10111111	$2^5 + 2^6 = 96$
3	11[000000] through 11[111111]	$2^6 = 64$

Number of Addresses for Each Range $= 2^8 / 4 =$ 64 addresses

P13) Subnet 1, Subnet 2, Subnet 3 — 60 interfaces (s1), 90 interfaces (s2), 12 interfaces (s3) } required

Prefix: 223.1.17/24

router interconnects

10/10

Three Network Addresses (a.b.c.d/x) that satisfy constraints:

2^8	2^7	2^6	2^5	2^4	2^3	2^2	2^1
256	128	64	32	16	8	4	2
	Subnet 2		Subnet 1		Subnet 3		

Subnet 2 Network Address

223.1.17.00000000/25 ✓ → 223.1.17.0 to 223.1.17.127

128

$\boxed{223.1.17.0}$

Subnet 1 Network Address

223.1.17.10000000/26 ✓ → 223.1.17.128 to 223.1.17.191

64

$\boxed{223.1.17.128}$

Subnet 3 Network Address

223.1.17.11000000/28 ✓ → 223.1.17.192 to 223.1.17.207

16

$\boxed{223.1.17.192}$

Homework #4	CS 372	Rhea Mae Edwards

P32) Count-to-Infinity in Distance Vector Routing

10/10

No, the count-to-infinity problem will not occur if we decrease the cost of a link, because the decreasing link won't cause a loop. When we connect two nodes that don't have a link, we also won't have the count-to-infinity problem occur, because it's similar to decreasing a link from some infinite weight to some finite weight.

Additional Questions

A1) Dijkstra's Shortest Path Algorithm

25/25

- From u to all network nodes

Step	N'	D(s),p(s)	D(t),p(t)	D(v),p(v)	D(w),p(w)	D(x),p(x)	D(y),p(y)	D(z),p(z)
0	u	4,u	2,u	1,u	3,u	∞	∞	∞
1	uv	4,u	2,u		2,v	4,x	2,v	∞
2	uvt	3,t			2,v	4,x	2,v	4,t
3	uvtw	3,t				3,w	2,v	4,t
4	uvtwy	3,t				3,w		4,t
5	uvtwys					3,w		4,t
6	uvtwysx							4,t
7	uvtwysxz							

A2) Distance-Vector Algorithm

10/25

- Node z's distance table for each iteration

-15

this is just the distance vector

cost to

		u	v	x	y	z
from	z	4	5	2	3	0
	v					
	x					
	y					

General Format Used: $D_x(y) \leftarrow \min_v \{c(x,v) + D_v(y)\}$ for each node $y \in N$

$D_z(u) = \min\{c(z,x) + D_z(u)\} = \min\{2+2\} = 4$

$D_z(v) = \min\{c(z,v) + D_z(v)\} = \min\{5+0\} = 5$

$D_z(x) = \min\{c(z,x) + D_z(x)\} = \min\{2+0\} = 2$

$D_z(y) = \min\{c(z,x) + D_x(y)\} = \min\{2+1\} = 3$

$D_z(z) = \min\{c(z,z) + D_z(z)\} = \min\{0+0\} = 0$

These formulas don't include the other possible paths represented within the graph, only the calculations of the shortest one presented.