CIS 457 Data Communication: Homework 4

The following are selected from the end of Chapter 4 problem set beginning at page 364 of the textbook. The problem numbers are shown in the parentheses. Total points 38.

- 1. (3 points) (R25) Suppose that an application generate chunks of 40 bytes of data every 20 msec, and each chuck gets encapsulated in a TCP segment and then an IP datagram. What percentage of each datagram will be overhead, and what percentage will be application data?
- 2. (P6) Consider the figure (on page 369 of your textbook).
 - (a) (8 points) Assuming a priority service, and the odd-numbered packets are high priority and evennumbered packets are low priority. Indicate the time at which packets 2 through 12 each leave the queue. For each packet, what is the delay between its arrival and the beginning of the slot in which it is transmitted? What is the average of this delay over all 12 packets?

Packet	Arrival	Departure	Delay
1	0	0	0
2	0		
3	1		
4	1		
5	3		
6	2		
7	3		
8	5		
9	5		
10	7		
11	8		
12	8		

(b) (8 points) Now assume round-robin service. Assume that packets 1, 2, 3, 6, 11, and 12 are from class 1 and the remaining packets are from class 2. Indicate the time at which packets 2 through 12 each leave the queue. For each packet, what is the delay between its arrival and the beginning of the slot in which it is transmitted? What is the average of this delay over all 12 packets?

Packet	Arrival	Departure	Delay
1	0	0	0
2	0		
3	1		
4	1		
5	3		
6	2		
7	3		
8	5		
9	5		
10	7		
11	8		
12	8		

3. (P8) Consider a datagram network using 32-bit address. Suppose a router has four links (0, 1, 2, 3) and packets are forwarded to the link as follows:

Use the table under question P8 (page 370) from your textbook

(a) (5 points) Replace the above table with a forwarding table with five entries which uses longest prefix matching

(b) (3 points) Using the (new) table, describe how the following destination addresses are forwarded

Destination Address	Output Link
11001000 10010001 01010001 01010101	
11100001 01000000 11000011 00111100	
11100001 10000000 00010001 01110111	

- 4. (6 points) (P11) Consider a router that interconnects three subnets: Subnet 1, Subnet 2, and Subnet 3. Suppose that all the interfaces in each of these three subnets are required to have the prefix 223.1.17/24. Also Suppose that Subnet 1 is required to support at least 60 interfaces, Subnet 2 is required to support at least 90 interfaces, and Subnet 3 is to support at least 12 interfaces. Provide three network addresses (of the form a.b.c.d/x) that satisfy these constraints. Important: Each of the subnet will be using prefix longer than 24 bits, which means the three subnets addresses would be 223.1.17.r/x, 223.1.17.s/y and 223.1.17.t/z. Determine r, s, t, x, y, z such that the network addresses have no conflict.
- 5. (5 points) (P17) Suppose datagrams are limited to 1500 bytes (including header) between source Host A and destination Host B. Assuming a 20-byte IP header, how many datagrams would be required to send an MP3 consisting of 5 million bytes? Explain how you computed your answer