1. What is the difference between round robin (RR) and weighted fair queueing (WFQ) packet scheduling? Is there a case where RR and WFQ will behave in exactly the same way

RR, round robin, is a network scheduling algorithm. It is a common solution for balancing network load even RR does not give perfect balanced load distribution. WQF, weighted fair queueing, on the other hand provides much efficient solution for balancing network load and give a better balanced load distribution by having the weight component which can determine how request should be sent among the specific servers. Thus, logically speaking, in a pool of uniform server(s), no differences in server performance environment, RR and WFQ will behave in exactly the same way.

2. Suppose an application generates 40-byte chunks of data every 20 milliseconds, and each chunk 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?

50%. TCP header = 20 bytes, IP headers = 20 bytes.

3. 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
00	0
010	1
011	2
10	2
11	3

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

Prefix	Min Addresses	Max Address	Range	Interface
00	00000000=0	00111111=63	64	0
010	01000000=64	01011111=95	32	1
011	01100000=96	01111111=127	32	2
10	10000000=128	10111111=191	64	2
11	11000000=192	11111111=255	64	3

4. Consider sending a 2400-byte datagram into a link that has an MTU of 700 bytes. Suppose the original datagram is stamped with the identification number 422. How many fragments are generated? What are the fragmentation-related IP datagram header fields? What are their values for this example?

1) How many fragments are generated?

There are 20 bytes of IP header in each 700 bytes.
The number of fragments generated will be (2400 – 20) /680 = 4

2) What are the fragmentation-related IP datagram header fields?

There are 4 fragmentation-related IP datagram.
Three has a size of 700 bytes (680 bytes data, 20 bytes header) & identification number 422.

Bytes of data: 2400-20 = 2380
The fourth fragment: 2380 – (680) (3) = 340 bytes of data

The 4th datagram has a size 360 bytes (340+20 bytes of header) & identification number 422.

3) What are their values for this example?

The values for offset value will be 0, 85, 170, 255 as in units of 8-byte chunks.
The first three fragments have flag=1. The last fragment will have flag=0.

5. 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

1500 bytes of datagram – 2*20 bytes of IP header = 1460 bytes of data. Since we are given 5 millions data, there would be $\left\lceil \frac{5*10^6}{1460} \right\rceil$= 3425 datagrams required.