Quiz 7

Write your name on the exam. Write something for every question. Students who do not write something for everything lose out over students who write down wild guesses. You will get some points if you attempt a solution but nothing for a blank sheet of paper. Write something down, even wild guesses. Problems take long to read but can be answered concisely.

Question	Maximum	Score
1	10	
2	6+2+2	
Total	20	

Question 1 – TCP

a) What is the difference between flow control and congestion control?

Flow control prevents the sender from sending more data than the receiver can handle, while congestion control prevents it from sending more data than the network can handle.

b) How does TCP detect congestion?

TCP uses timeouts at the sender to detect lost packets and considers all losses a sign of congestion.

c) Why does TCP need to estimate the roundtrip time?

To set the retransmission timers appropriately.

d) Why does fast retransmit help even without fast recovery?

It increases performance because the lost packet is retransmitted before the retransmission timer fires.

e) Why does TCP congestion control use slow start at the beginning of a connection instead of directly going into the additive increase/multiplicative decrease mode?

By using AIMD with an initial window of 1 MSS it may take too long to reach a large enough congestion window. By using AIMD with a large initial window, the connection may send too much data before noticing the first loss (and cause excessive congestion). When the available bandwidth is low, slow start causes less congestion than AIMD with a large initial window, when it is high, slow start is faster than AIMD with a small initial window.

Question 2 – QoS

a) A data source in an intserv network commits to send within the limits of a leaky bucket defined in terms of packet as follows: a burst size of 10 packets and an average rate of 2 packets per second. This means that for any time interval of size t seconds, the sender will have sent at most 2*t+10 packets. The table below describes some measurements for the number of packets sent in the first two seconds, the third and fourth second, and the fifth and sixth second. For each scenario, establish whether the sender violated its commitment or not – it is also possible that the data provided is not conclusive.

Measurement results (# of packets)			Your verdict		
sec 1 & 2	sec 3 & 4	sec 5 & 6	Violation	No violation	Not enough data to tell
3	3	3		X	
3	15	1	X		
8	8	8	X		
2	9	9			X
9	4	7			X
3	7	6			X

b) TCP flows implement congestion control and slow down in response to packet losses, but UDP flows may not. When UDP and TCP flows compete for using a congested network, which scheduling algorithm is more conducive to fair sharing of the available network capacity: FIFO or round robin?

Round robin.

c) Why does a QoS architecture that gives service level guarantees need some form of admission control?

QoS guarantees are not possible when the network traffic exceeds the capacity of the network (and this can happen for all realistic topologies), so to give guarantees, the network must be able to deny service when admitting a new flow could lead to QoS violations.