COMP9331 Lab5

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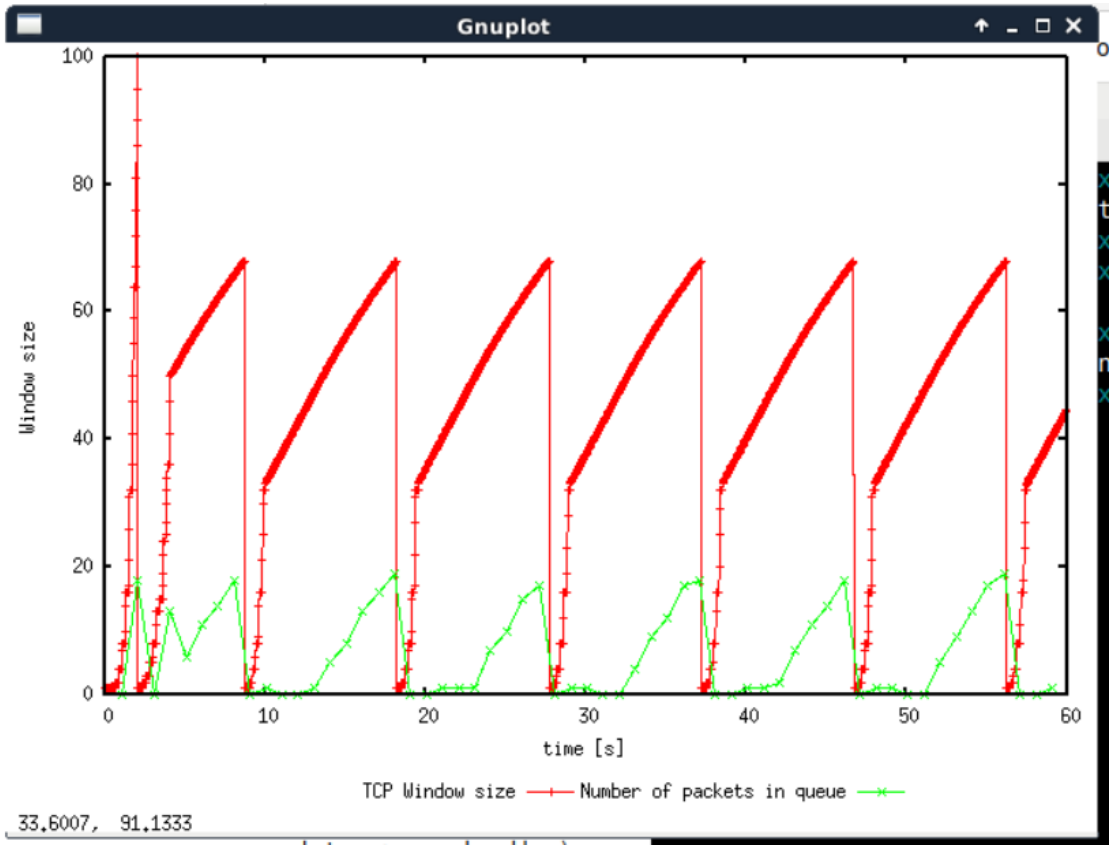
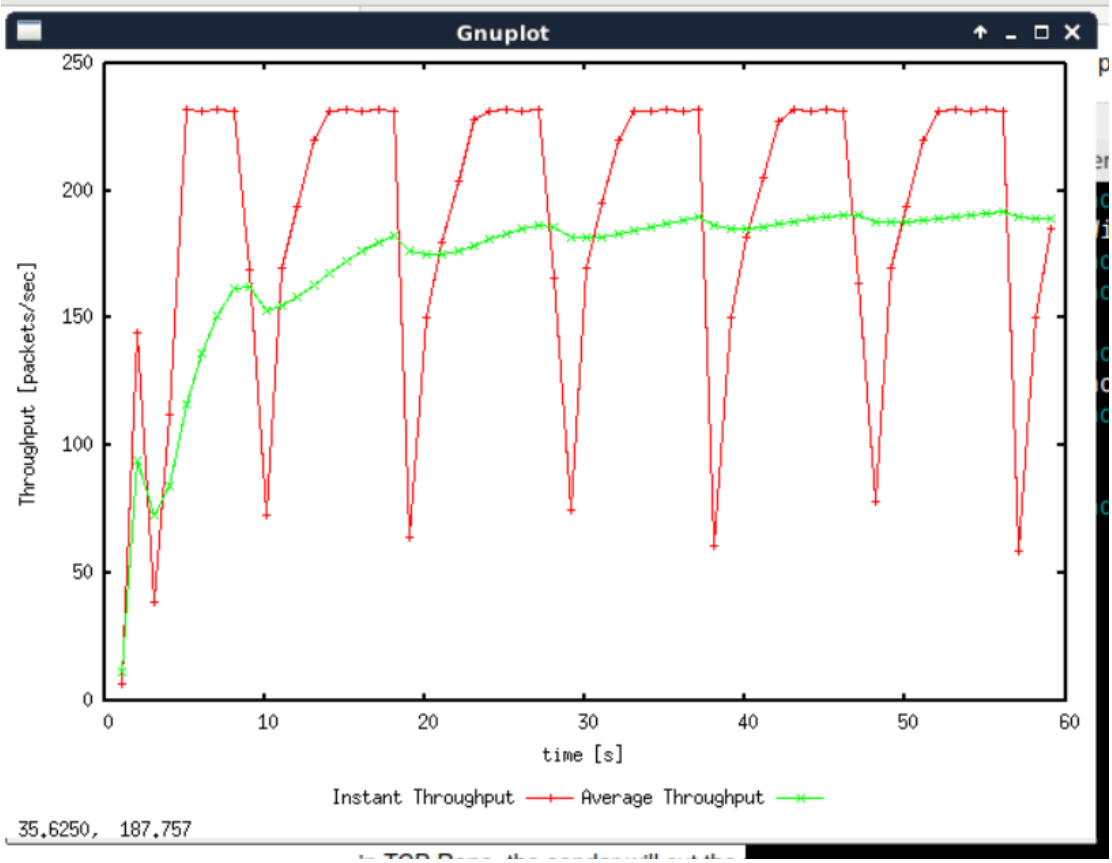
Exercise 1:

Question 1:



The maximum size of the congestion window is 100. Because the maximum size of the queue is only 20 packets, so additional packets are dropped. That's why it stopped at 100 rather than 150. And this led to the congestion event at the sender, then the congestion window is reset to 1 and the threshold equals to 1/2 the size of the window. Next, it will turn to the slow start and the window size will increase again and the queue is full again. The connection will repeat the previous process and decrease to 1 and go back to the early start phase.

Question 2:



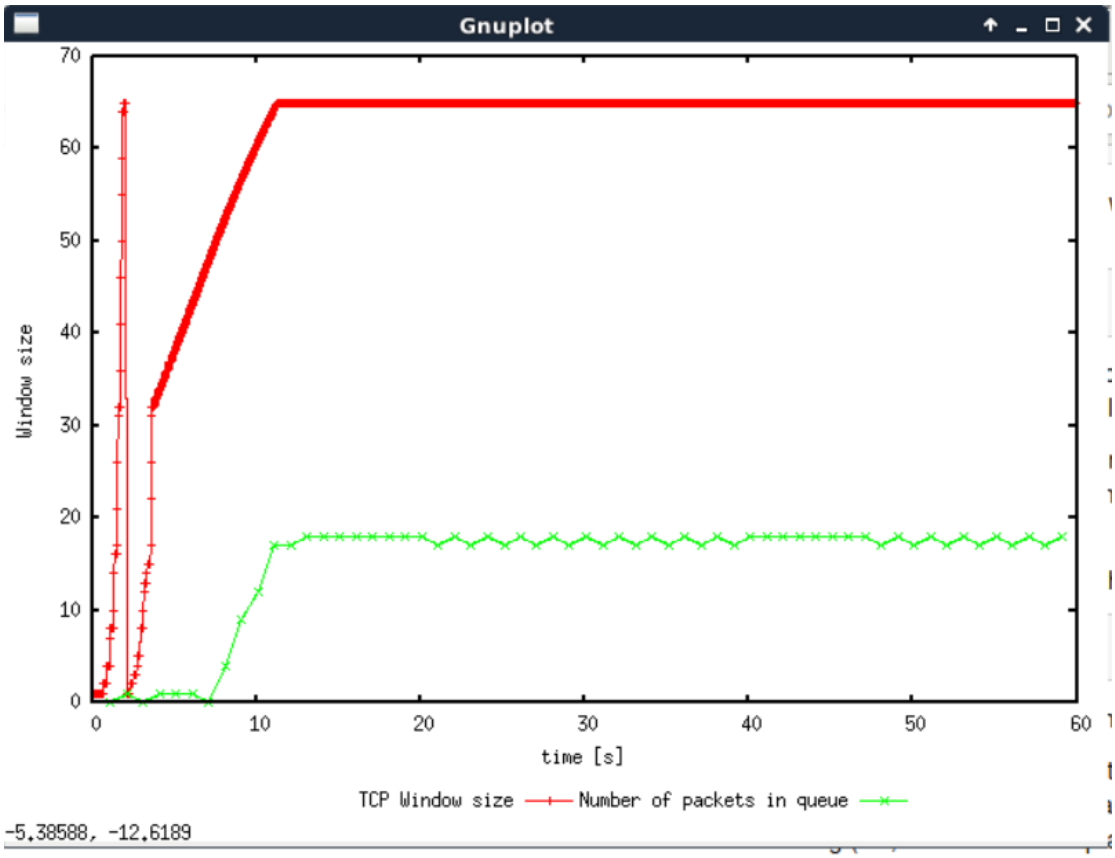
The average throughput of TCP is around 190 packets per sec.

If consider the payload and header, the throughput is (500+20+20) *190*8=802.8 kbps

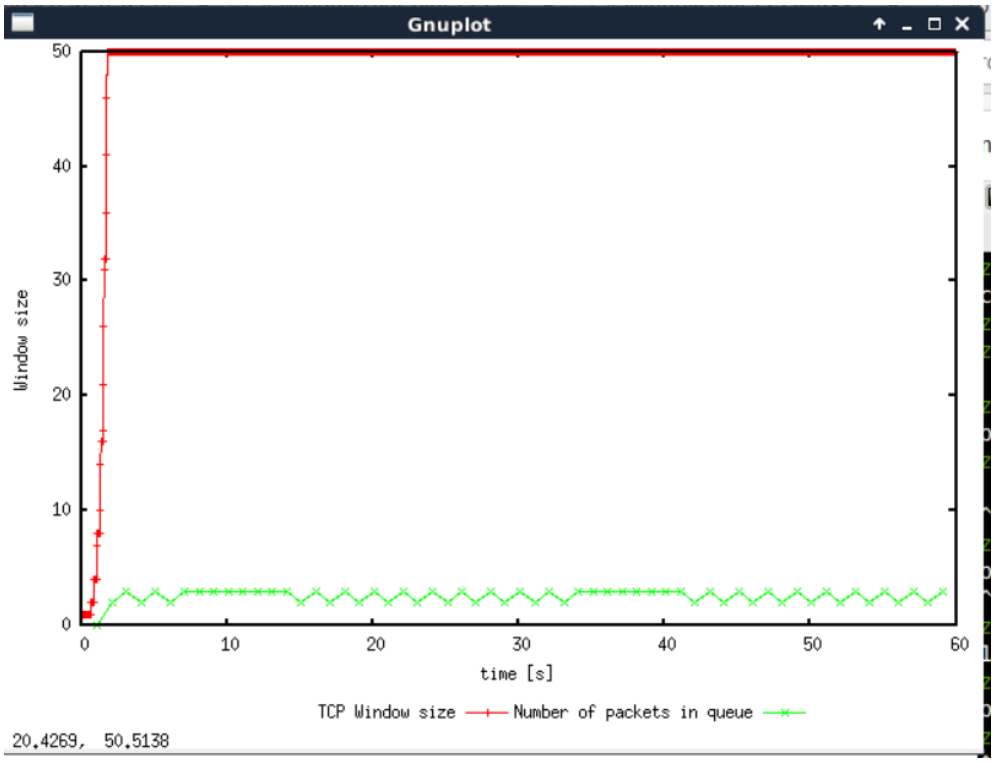
If only consider the payload, the throughput is 500 *190*8=760 kbps

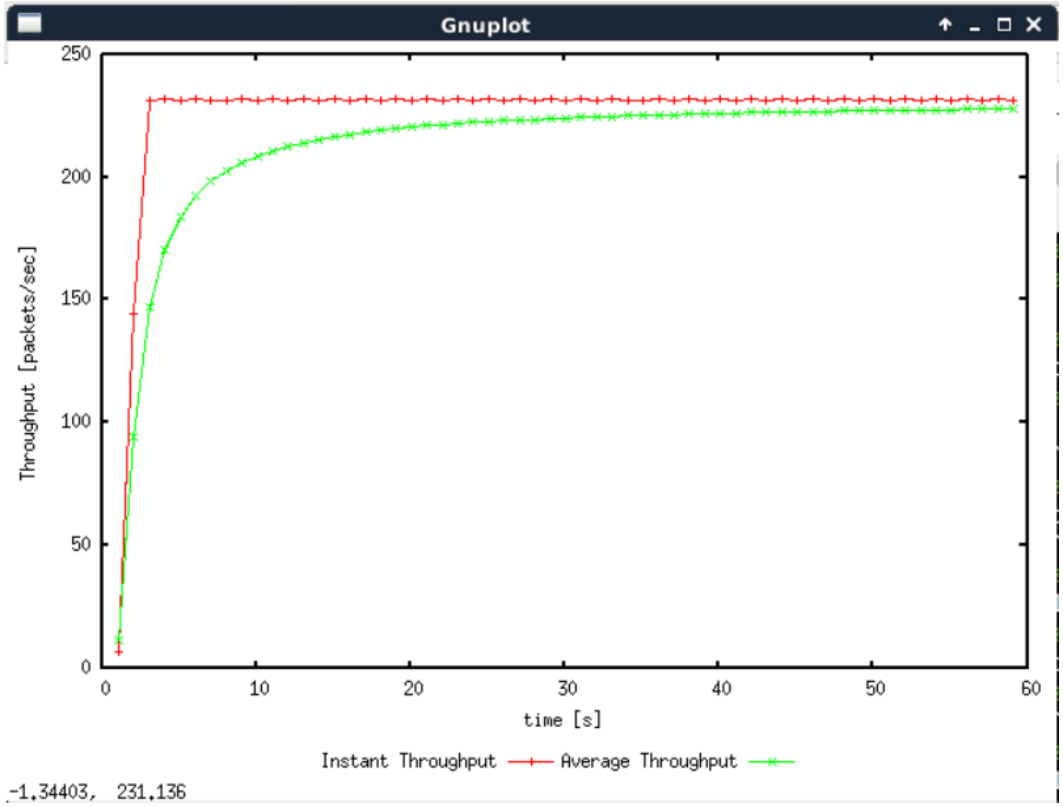
Question 3:

With some practice on different size of windows, we can see when the maximum congestion window size becomes greater than the maximum queue size, some packets will get dropped and TCP will go back to slow start.



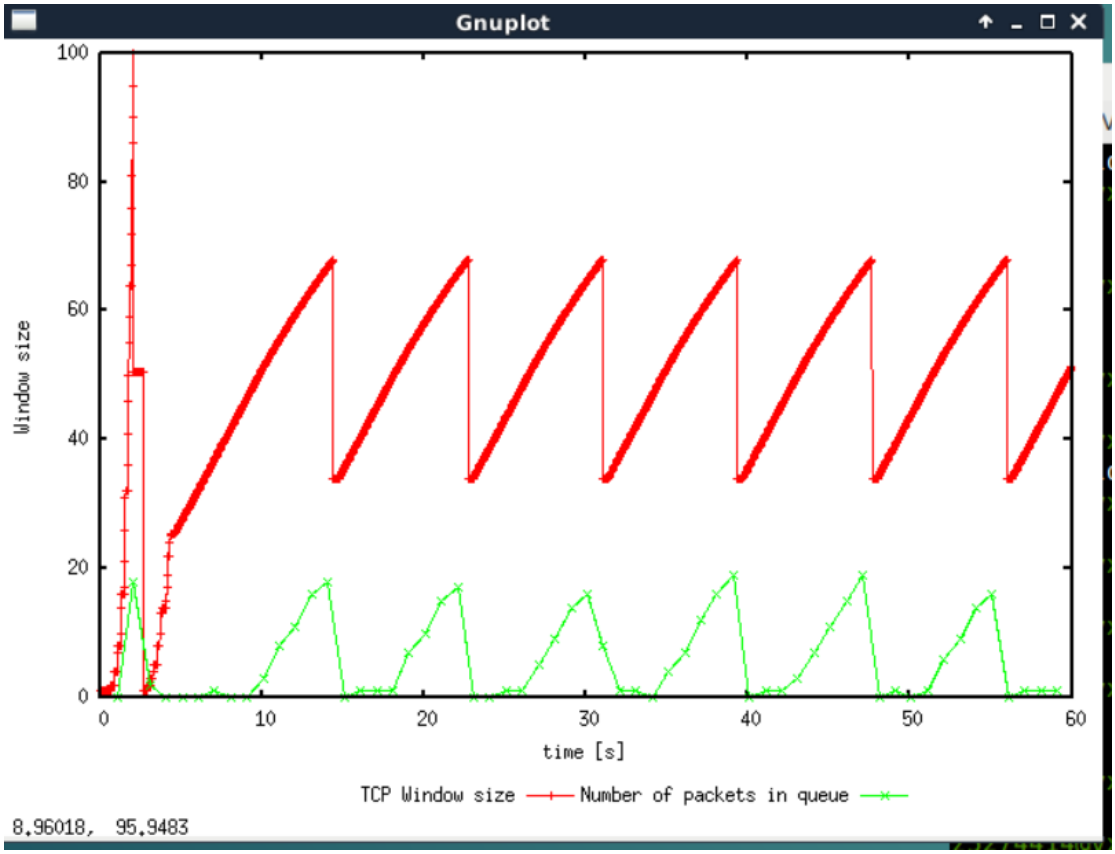
According to the picture above , the maximum congestion window size is around 666.



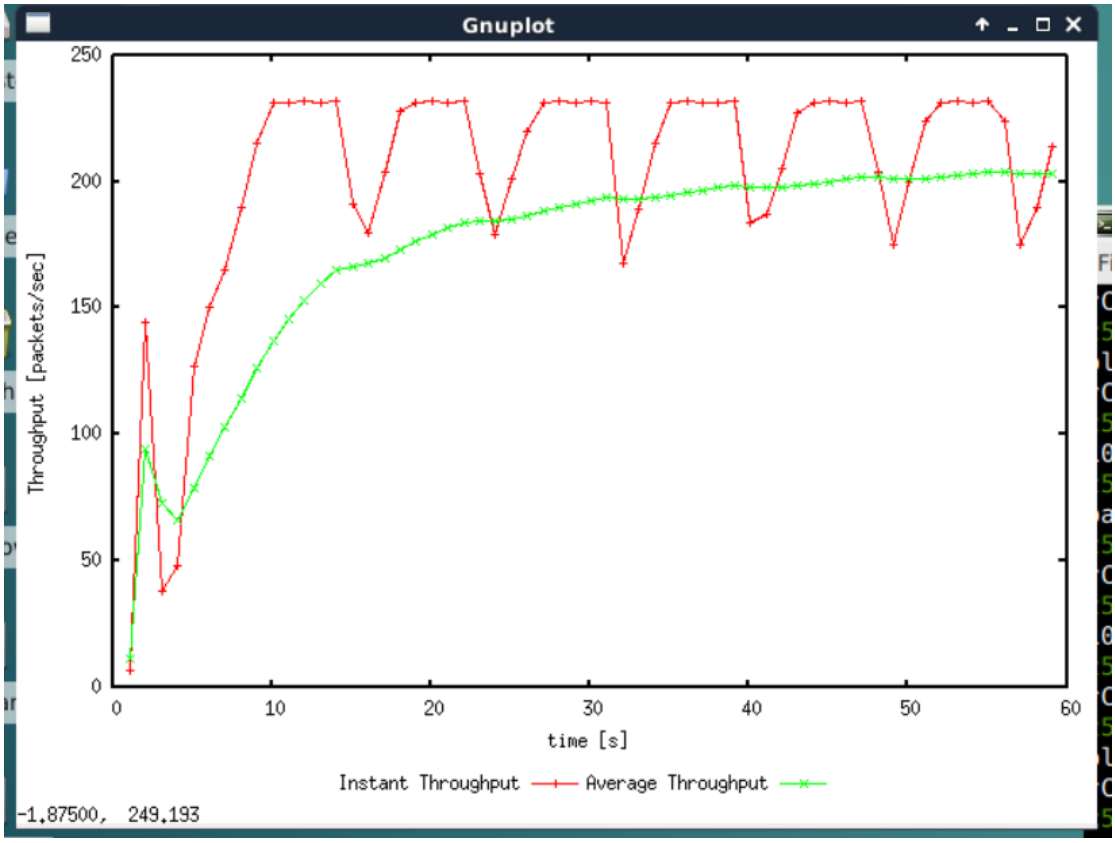


According to the pictures above, the average throughput is around 225 packets per sec and the average throughput is 225*500*8=900 Kbps, which is almost equal to 1Mbps.

Question 4:



TCP Reno half the window size rather than reducing the window size to 1 when it meets the loss and it will increase linearly and repeat the process when the loss happens again.



The average throughout is almost 200.

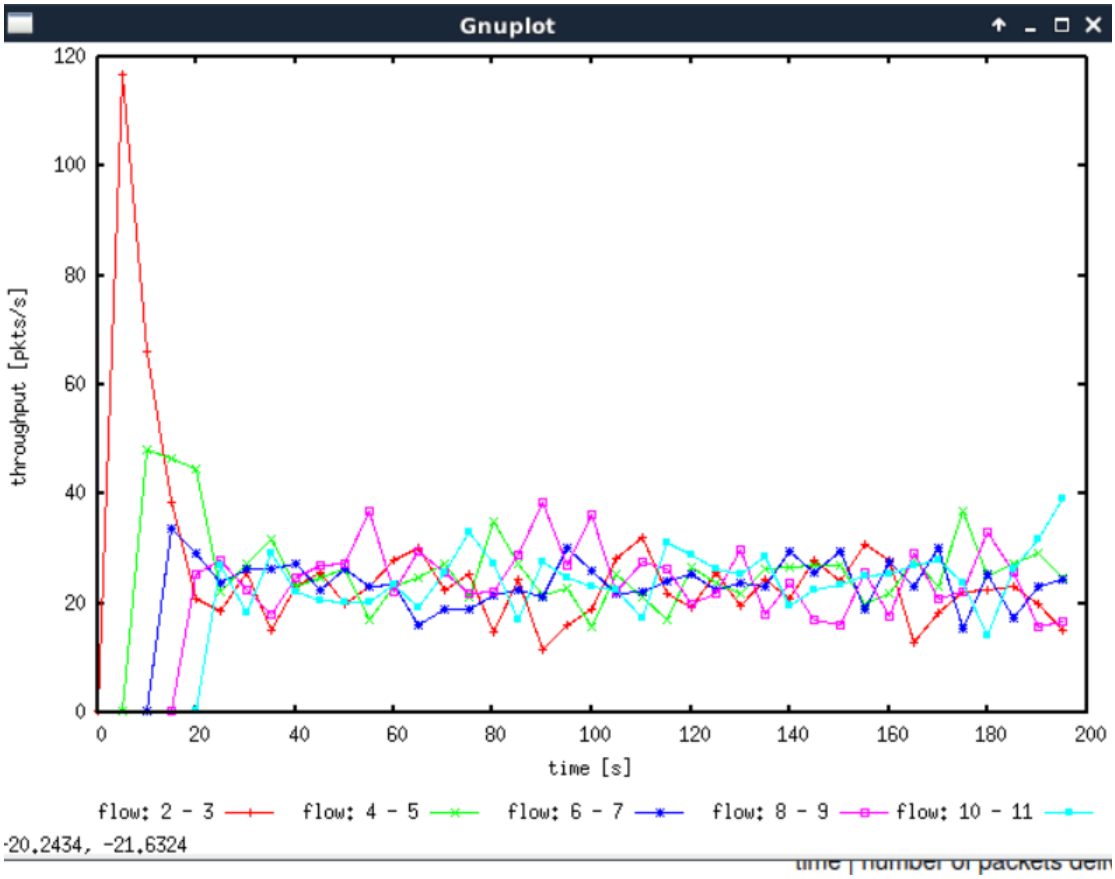
Throughput is 200*540*8=864 kbps with header and 200*500*8=800 kbps without header.

TCP Tahoe cuts the window size to 1 when loss happens and TCP Reno cuts the size to half.

The average throughout of TCP Reno is slightly higher than TCP Tahoe

Exercise 2:

Question 1:



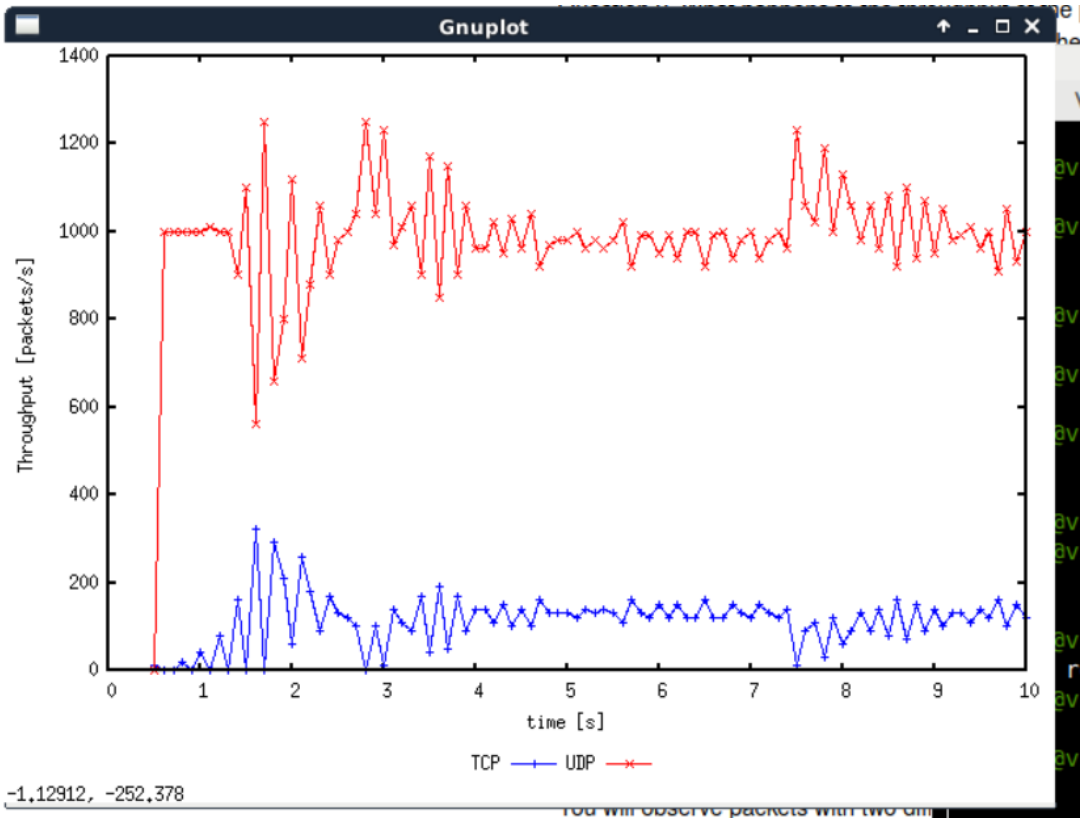
Each flow gets an almost equal share of the capacity of the common link. This is because the flow is controlled base on the AIMD algorithm which ensures a dynamic balance.

Question 2:

When comes a new flow, the link resource for each flow will reduce. This is because the new flow's slow start phase will lead the congestion. According to this, the TCP connections will detect the losses and ACKs and timeout, adapt the size of the congestion. It is fair because the fair share of all existing flows will reduce when a new flow is added.

Exercise 3:

Question 1:



The UDP will transmit without any congestion control, and it's faster than TCP. So the UDP will continue to transmit at its rate while TCP will consider the capacity of the network.

Question 2:

Because it's not controlled by the congestion control. UDP don't care about the loss which is different from TCP. When TCP meets UDP flows, it will slow the rate but UDP won't. So TCP will be slower.

Question 3:

Advantage: UDP is not restricted by congestion control and can have transmission rate and reduce the transmission delay.

Disadvantage: It’s not a reliable transmission protocol. It doesn’t care about the loss which will lead to the file can’t be completed which needs reliable data transfer.

If everybody started using UDP instead of TCP, there will be large congestion and nobody will reduce the speed and will lead to collapse of the network. The website won’t show the page and email will lose attaches.