Assignment on understanding TCP basics and TCP congestion control

Do the following:
- Start up Wireshark and begin packet capture (Capture->Start) and then press OK on the Wireshark Packet Capture Options screen
- Add capture filter tcp and start the capture
- Open http://fimi.uantwerpen.be/data/ in your browser
- Download **webdocs.dat.gz** file from that website
- After downloading some percentage pause for 15 seconds and resume it.
- Stop Wireshark packet capture after full download and save as <<YOUR ROLL NUMBER>>_TCP.pcapng

Select any one of the packets of the conversation between your machine and server, and right click on the packet > Conversation Filter > TCP and enter. Save the filtered capture as a separate file *<<YOUR ROLL NUMBER>>_TCP_filter.pcapng*

Open the *<<YOUR ROLL NUMBER>>_TCP_filter.pcapng* file separately and answer the following questions from the captured trace and provide a screenshot for each.

   What are the packets involved in 3-way handshake (provide packet id and highlight those packets in screenshot)?

1. What is the sequence number of the TCP SYN segment that is used to initiate the TCP connection between the your client computer (your machine) and http://fimi.uantwerpen.be/data/?
2. What is the sequence number of the SYNACK segment sent by http://fimi.uantwerpen.be/ to the client computer in reply to the SYN? What is the value of the Acknowledgement field in the SYNACK segment?
3. What is the length of each of the first six TCP segments?
4. What is the minimum amount of available buffer space advertised at the received for the entire trace?
5. What did you observe in the packet trace when you pause the downloading in between?
6. Are there any TCP Out-Of-Order and/or TCP Fast Retransmission segments on the collected trace? Discuss?
7. What is the throughput (bytes transferred per unit time) for the TCP connection? Explain how you calculated this value. In addition, add the screenshot by doing the following step: Select one of the TCP segments, then select the menu : Statistics->TCP Stream Graph-> Throughput.
8. Select one of the TCP segments, then select the menu : Statistics->TCP Stream Graph-> Time-SequenceGraph(Stevens). From the graph answer the questions below:
   a. Where and when the slow start phase begins and ends (also attach the zoomed plot)? You can zoom the graph and see it.
   b. Where and when congestion avoidance takes over? You can zoom the graph and see it.

Deliverables in Eduserver as a tarball with the following:

- Captured wireshark packet traces with the names: <<YOUR ROLL NUMBER>>_*TCP.pcapng and* <YOUR ROLL NUMBER>_TCP_filter.pcapng
- A readable PDF Report (with name "WiresharkTCP-<<RollNo>>.PDF") with the answers for the aforementioned questions on the captured packet traces.

Late Policy:
10% cut in marks for each late day.

Note : Zero tolerance to plagiarism, department anti-plagiarism policy applies. Include below given anti-plagiarism statement in verbatim at the end in your assignment report.

PLAGIARISM STATEMENT

I certify that this assignment/report is my own work, based on my personal study and/or research on my personal/lab equipment and that I have acknowledged all material and sources used in its preparation, whether they be books, articles, reports, lecture notes, and any other kind of document, electronic or personal communication. I also certify that this assignment/report has not previously been submitted for assessment in any other course, except where specific permission has been granted from all course instructors involved, or at any other time in this course, and that I have not copied in part or whole or otherwise plagiarised the work of other students and/or persons. I pledge to uphold the principles of honesty and responsibility at CSE@NITC. In addition, I understand my responsibility to report honour violations by other students if I become aware of it.

Name:

Date:

Signature: <keep your initials here>