第八次作业：（英文版教材第六章 8，10，11，18，19，21，22，25，26，27，28，教材第一章 12，20，补充题）

8. (Max-Min Fairness) In Figure 6-20, suppose a new flow E is added that takes a path from R1 to R2 to R6. How does the max-min bandwidth allocation change for the five flows?

10. (Congestion Control Law) Some other policies for fairness in congestion control are Additive Increase Additive Decrease (AIAD), Multiplicative Increase Additive Decrease (MIAD), and Multiplicative Increase Multiplicative Decrease (MIMD). Discuss these three policies in terms of convergence and stability.

11. (UDP) Why does UDP exist? Would it not have been enough to just let user processes send raw IP packets?

1-20. (UDP vs. TCP) What is the similarity of UDP and TCP? What is the main difference between them?

1-12. (byte-stream vs. message stream) Two networks each provide reliable connection-oriented service. One of them offers a reliable byte stream and the other offers a reliable message stream. Are these identical? If so, why is the distinction made? If not, give an example of how they differ.

18. (Minimum MTU) What is the total size of the minimum TCP MTU, including TCP and IP overhead but not including data link layer overhead?

19. (Fragmentation vs. TCP) Datagram fragmentation and reassembly are handled by IP and are invisible to TCP. Does this mean that TCP does not have to worry about data arriving in the wrong order?

21. (Connection vs. port) A process on host 1 has been assigned port p, and a process on host 2 has been assigned port q. Is it possible for there to be two or more TCP connections between these two ports at the same time?

22. (ACK bit vs ack sequence number) In Fig. 6-36 we saw that in addition to the 32-bit acknowledgement field, there is an ACK bit in the fourth word. Does this really add anything? Why or why not?

25. (TCP congestion control) Consider the effect of using slow start on a line with a 10-msec round-trip time and no congestion. The receive window is 24 KB and the maximum segment size is 2 KB. How long does it take before the first full window can be sent?

26. (TCP congestion control) Suppose that the TCP congestion window is set to 18 KB and a timeout occurs. How big will the window be if the next four transmission bursts are all successful? Assume that the maximum segment size is 1 KB.

27. (TCP RTT) If the TCP round-trip time, RTT, is currently 30 msec and the following acknowledgements come in after 26, 32, and 24 msec, respectively, what is the new RTT estimate using the Jacobson algorithm? Use $\alpha = 0.9$.

28. (Throughput and Line efficiency) A TCP machine is sending full windows of 65,535 bytes over a 1-Gbps channel that has a 10-msec one-way delay. What is the maximum throughput achievable? What is the line efficiency?

补充题：TCP 拥塞控制

主机甲和乙已建立了 TCP 连接，甲始终以 MSS=1KB 大小的段发送数据，并一直有数据发送；乙每收到一个数据段都会发出一个接收窗口为 10KB 的确认段。若甲在 t 时刻发生超时时拥塞窗口为 8KB，则从 t 时刻起，不再发生超时的情况下，请计算经过 10 个 RTT 后，甲的发送窗口是多少？

Quiz：英文版教材第七章 4，6，18，20
自己练习，不用交作业

4. (DNS) In addition to being subject to loss, UDP packets have a maximum length, potentially as low as 576 bytes. What happens when a DNS name to be looked up exceeds this length? Can it be sent in two packets?

6. (DNS) Can a machine with a single DNS name have multiple IP addresses? How could this occur?

18. (Email) IMAP allows users to fetch and download email from a remote mailbox. Does this mean that the internal format of mailboxes has to be standardized so any IMAP program on the client side can read the mailbox on any mail server? Discuss your answer.

20. (Email) Does Webmail use POP3, IMAP, or neither? If one of these, why was that one chosen? If neither, which one is it closer to in spirit?