Homework 3 part 2:

37. a) GBN: Sends 9 segments, it sends 1 2 3 4 5, but then since there is no 2, it will send 2 3 4 5, B will send 8 ACKS, It will send 4 acks for 1, and 4 acks for 2,3,4,5.

b)Selective Repeat: It will send 6 segments, 1,2,3,4,5, and then 2 again because 2 was missing. It will send out 5 ACKS, 4 acks with 1,3,4,5 and 1 ack with 2.

c) TCP: TCP sends 6 segments, 1,2,3,4,5, and then 2 again because it was missed. B will send 5 acks, 4 acks with sequence number 2, one ack with sequence number 1.

d) TCP sends the shortest beause it used a faster retransmit and didn’t wait for timeout.

40)

a) [1,6], [23,26]

b)[6,16] [17,22]

c) triple duplicate ack

d) time out

e) 32

f)21

g)13

h)1,2,4,8,16,32,64, the 7th round

i) congestion window an d threshold = ½ of the congestion window (8) so the new values and threshold will be 4

j)the threshold is 21, but the window goes back to 1 and goes back up to 4 by 19 (doubling)

k) 17: 1, 18: 2, 19: 4, 20: 8, 21: 16, 22:21 = 52 packets.

42) TCP is not a stop and wait protocol. It uses Pipelining and allows the sender to have multiple unacknowledged segments. It needs congestion control because it will mitigate the amount of data received from the application, because without it , a tcp sender would be able to send a large number of first-time packets into the network, even if the network would be congested.

44) 1 RTT for 7MSS, 2 RTT for 8 MSS, 3 RTT for 9MSS, 4 RTT for 10MSS, 5 RTT for 11MSS, 6 RTT for 12MSS

b) 6+7+8+9+10+11 = 51/6 = 8.5 MSS/RTT

46) a)

Max size \* 1500 \* 8 / 150\*10^-3 = 10\*10 ^ 6

Maxsize\* 80000 = 10^7

Maxsize = 1/(8)\*10^3

Maxsize = 125

One of the two.

b) Varies from w/2 to w, which is is w3/4 = 125\*3/4 = 94, the throughput would be: 94\*1500\*8/(150\*10^-3) = 94\*1500\*8/.15 = 7.52 mbps

c) It would take 94/2 \* .15 = 7 seconds