

**Homework #5**

**Student Name:** \_\_\_\_\_

**Problem #1:**

Host A and B are communicating over a TCP connection, and Host B has already received from A all bytes up through byte 150. Suppose Host A sends three segments to Host B back-to-back. The first, second, and third segments contain 50, 80, and 100 bytes of data, respectively. Host B sends an acknowledgment whenever it receives a segment from Host A.

Suppose the first segment sent by A has lost and did not arrive at B. In addition, the second acknowledgment from B is lost, while the third acknowledgment arrives in time.

Draw a timing diagram showing these segments and all other segments and acknowledgments sent to deliver the three segments successfully at B. Assume there is no additional packet loss, and all future packets arrive in time. For each segment in your figure, provide the sequence number and the number of bytes of data; for each acknowledgment you add, provide the acknowledgment number.

**Problem #2:**

Host A and B are communicating over a TCP connection using Go-Back-N Pipelined Protocol, and Host B has already received from A all bytes up through byte 512. Host A is going to send six segments of each 64 bytes of data. Host A sends three segments back-to-back and waits for an acknowledgment before transmitting the other three segments. Moreover, Host B sends an acknowledgment whenever it receives a segment from Host A. Suppose the first acknowledgment from B has lost, the second segment sent by A has lost and did not arrive at B, and the third acknowledgment arrives late after expiring of round trip timer. However, all future segments and their acknowledgments arrive in time, and there is no loss of any future segment and acknowledgment.

Draw a timing diagram showing these segments and all other segments and acknowledgments sent to deliver the six segments successfully at B. For each segment in your figure, provide the sequence number and the number of bytes of data; for each acknowledgment you add, provide the acknowledgment number.