P3:

1. What is the 1s complement of the sum of these 8-bit bytes? (Note that although UDP and TCP use 16-bit words in computing the checksum, for this problem you are being asked to consider 8-bit sums.) Show all work

Add and wrap around if overflow:

01010011 + 01100110 = 10111001

10111001 + 01110100 = 00101110

1s complement: 11010001

1. Why is it that UDP takes the 1’s complement of the sum; that is, why not just use the sum?

User Datagram Protocol (UDP) uses the 1’s complement as it is same as the checksum of the sum.

The checksum is used by the receiver (host) to identify the errors in the segment.

1. With the 1s complement scheme, how does the receiver detect errors?

To detect errors, the receiver adds all the 16-bit words of the segment, including the checksum. The result should be all bits 1. If any bit of the result contains a zero, the receiver knows there is an error in the segment.

1. Is it possible that a 1-bit error will go undetected?

All one-bit errors will be detected.

1. How about a 2-bit error?

Two-bit errors can be undetected (e.g. if the last digit of the first word is converted to a 0 and the last digit of the second word is converted to a 1).

P8:

The different between rdt2.2 and rdt3.0 is the timeout scheme, and add the possibility of duplication. Since rdt2.2 receiver is able to handle duplicate, the FSM of receiver side in rdt2.2 and rdt3.0 is the same.

