P3. UDP and TCP use 1s complement for their checksums. Suppose you have the following three 8-bit bytes: 01010011, 01100110, 01110100.

(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.

01010011+01100110 = 10111001

10111001+01110100 = 00101110

So the One’s complement = 11010001

(2)Why is it that UDP takes the 1s complement of the sum; that is, why not just use the sum?

To detect error. If the sum plus the checksum is not 11111111, there is an error.

(3)With the 1s complement scheme, how does the receiver detect errors?

If the sum plus the checksum is not 11111111, there is an error.

(4)Is it possible that a 1-bit error will go undetected?

No, it is not.

(5)How about a 2-bit error?

It is possible. For example, 01010011 changes to 01010010 at the same time when 01110100 changes to 01110101, the checksum will not detect the error.

P8. Draw the FSM for the receiver side of protocol rdt3.0.

