CS 335, Assignment 3

(Please submit your answers in a single PDF file using UR Courses)

**NOTE: The objective of this assignment is that you study the textbook and the slides, and then answer the questions below yourself. You SHOULD NOT simply copy and paste the answers from the textbook or from the slides.

Total = 46

1. (i) [2] Mention any two services that TCP can provide but UDP cannot provide.

(ii) [2] Suppose a process in Host C has a UDP socket with port number 6789. Suppose both Host A and Host B each send a UDP segment to Host C with destination port number 6789. Will both of these segments be directed to the same socket at Host C? If so, how will the process at Host C know that these two segments originated from two different hosts?

(iii) [6] Suppose Client A initiates a session with Server S. At about the same time, Client B also initiates a session with Server S. Provide possible source and destination port numbers for:

(a) The segments sent from A to S.

(b) The segments sent from B to S.

(c) The segments sent from S to A.

(d) The segments sent from S to B.

(e) If A and B are different hosts, is it possible that the source port number in the segments from A to S is the same as that from B to S?

(f) How about if they are the same host?

(iv) [2+2] Suppose you have the following 2 bytes: 01011100 and 01100101. What is the 1s complement of the sum of these two bytes? Give an example where 1 bit is flipped in each of the two bytes and yet the 1s complement does not change.

2. (i) [3] What are the three properties of Reliable Data Transfer?

(ii) [2+2] Suppose host A sends a packet to host B. How can A be ensured that the packet did not corrupt in the channel? If the packet was corrupted, what can be done?

(iii) [2+2] In our rdt protocols, why do we need to introduce sequence numbers and timers?

(iv) [5] Draw the Finite State Machine (FSM) for the receiver side of protocol rdt3.0.

3. (i) [4] Consider the data transfer between two hosts A and B, with the stop-and-wait protocol, rdt3.0. A is located on the West Coast of the United States and B is located on the East Coast. The speed-of-light round trip propagation delay between A and B, RTT, is approximately 30 milliseconds. Suppose that A and B are connected by a channel with a transmission rate, R, of 1Gbps. Given the packet size, L, of 1500 bytes, determine the channel utilization.

(ii) [6] Following the problem (i), consider the pipelined technique instead of stop-and-wait protocol. How big would the window size have to be for the channel utilization to be greater than 98%?

(iii) [2] What does the receive window (rwnd) field in a TCP segment indicate?

(iv) [2+2] Why are the flow control and congestion control needed?