Welcome to the Final Exam for Computer Network and Distributed Computing at such a tough time of the new coronavirus. This exam is open book. There are nine required problems of differing point values. Each question is clearly labeled with its value. Read each problem carefully. You may have with you a calculator, a laptop, pencils and/or pens, erasers, and blank papers. You are allowed to surf the web while working on the solution of all the problems. All your problem solutions must be handwritten on the answer sheets in pencil or ink. Solutions are NOT allowed written on the problem sheet. You have 120 minutes for this exam. Please make sure use separate answer sheets for the solution to each problem. Good luck and be sure to show your work!

**Predefined parameters:**

Please carefully read all these paragraphs to get a well understanding of the predefined parameters. All the variables predefined here will be used throughout the whole examination.

Suppose that string A is your student ID and the 32 bits unsigned integer B is the last 6 digital value of your student ID. For example, if your student ID is 2012302580001 then A = “2012302580001”, B = 580001.

Now write down your input predefined variables as **the first two lines on the head of your answer sheet**:

A = “ ”

B =

**Before proceed to the questions below, please carefully check the above inputs several times to make sure that your inputs are correct. Most of the problems will be based on these predefined parameters.**

**Problem #1**

**Suppose that C is the 16-bit word of the low-order word of the predefined variable B. Let D = 1110 0000 0000 0001 be another 16-bit word. Calculate to show the internet check sum of the bits of C and D.**

**Problem #2**

**Suppose that C is as defined as in Problem 1. Let C\_1 be the low-order byte of C and C\_2 be the high-order byte of C.** **Recall that with the CSMA/CD protocol, the adapter waits 512K bit times after a collision, where K is drawn randomly. Suppose now that adapter A\_1 experienced a collision with adapter A\_2. Adapter A\_1 randomly chosen K = C\_1 via adapter A\_2 randomly chosen K = C\_2. How long does each adapter wait for in a 10 Mbps broadcast channel? What about for a 100 Mbps broadcast channel?**

**Problem #6**

**Suppose that C\_1 is as defined as in Problem 2. Suppose a sender using the CRC generator polynomial x4+x+1 sends C\_1 as a sequence of 8 bits. What is the result sequence the sender sends out? Show your work. Now that the receiver received these bits and the first bit ( the most significant bit ) is bit flipped during transmission, how does the receiver detect out this error? Show with detail computation.**