CPSC 2500
Computer Organization
Homework 1 (50 points)
Due: October 6, 9:20 AM, in class

NOTE: Please type/write your answers to the following questions and submit hard copy in class. This assignment is to be done individually; you can discuss the problems with your classmates, but you should write your answers independently.

1. Convert the following decimal numbers to binary. Show your work: (4 + 4)

a) 1234
b) 1969

2. Convert the following binary numbers (currently in two's complement) to decimal. Show your work: (4 + 4)

a) 00110010
b) 11110110

3. In class, we have seen the procedure for expressing decimal numbers in base 2 (binary), 8 (octal), and 16 (hexadecimal). In this problem, you need to extend that knowledge to convert the following decimal numbers to different number systems as mentioned below. **Hint:** You can employ a method similar to the division method for converting decimal numbers to binary (outlined in slide 11 of DataRepresentation.pdf). For converting to base "k," employ division by k. (3 + 3 + 3)

a) Convert 91 to base 8 number system.
b) Convert 100 to base 7 number system.
c) Convert 55 to base 11 number system.

4. For this question refer to the Computer Level Hierarchy on slide 20 of Introduction.pdf (available on Canvas). As we discussed in class, level 3 (the Operating System Machine level) is usually a hybrid level. Most of the instructions at this level are also in the ISA level, i.e., level 2. Those level 3 instructions that are identical to level 2's are executed directly by the microprogram or hardware control (at level 2), not by the operating system (at level 3). Is this a good execution choice? Why or why not? (2 + 5)

5. Perform the following calculations. All numbers are in 8-bit two's complement form. Indicate if overflow occurs. (4 + 4 + 4 + 4)

a) 11111101 + 11111101;
b) 11111101 – 11111111;
c) 00000001 – 11111111;
d) 10000000 – 10000010;

6. Which of the following are valid hexadecimal numbers? (1 + 1)
a) EFFECT
b) ADD