Instructions: For the following questions, *show all of your work*. It is not sufficient to provide the answers.

Exercise 1. Convert each of the following numbers to 8-bit signed magnitude, 8-bit one's complement and 8-bit two's complement.

a. $(-122)_{10}$

b. $(-31)_{10}$

c. $(-16)_{10}$

d. 127_{10}

Exercise 2. Convert the following 16-bit two's complement numbers in hexadecimal representation to decimal.

a. FFF5_{16}

b. 7CD9_{16}

c. 00BB_{16}

d. 8000_{16}

Exercise 3. Find the decimal equivalents for the following 8-bit two's complement numbers.

a. 1000 0001

b. 0111 1011

c. 1111 0001

d. 0010 1010

Exercise 4. Perform two's complement addition on the following pairs of numbers. In each case, indicate whether an overflow has occured.

a. 1110 1011 + 0110 1001

b. 1110 1011 + 1111 1111

c. 1000 1100 + 1100 0001

d. 0111 1001 + 0000 1001