CDA 3103 Computer Organization
Homework #2
Assigned: Fri., Jan. 17, 2014
Due: 11:59pm by Canvas submission, Jan. 27, 2014

1 Problem set directions: *For the following problem set, show your work.*
1. Convert $AC12_{16}$ to binary and to octal.
2. Complete the following from the end-of-chapter Exercises in Ch. 2 and show your work: 2 (also give problem #2 in binary), 4 (c), 6 (c and d), 7 (a and b), 12, 13, 26 (assume values are in two's complement format), and 33 (b and d)
3. What decimal value does the 8-bit binary number 10011010 have if:
    a. it is interpreted as an unsigned number?
    b. it is on a computer using signed-magnitude representation?
    c. it is on a computer using one's complement representation?
    d. it is on a computer using two's complement representation?
4. Given the following two binary numbers, 11111100 and 01011001,
    a. Which is the larger unsigned number?
    b. Which of these two numbers is the larger when it is being interpreted on a computer using signed-two's complement representation?
    c. Which of these two is the smaller when it is being interpreted on a computer using signed-magnitude representation?
5. Perform the following unsigned operations:
    (a) $110111_2 + 110001_2$
    (b) $10011_2 - 101_2$
6. Using 8-bit binary numbers, let x = 89 and y = 27. Show your work while completing 2's complement operations for the following:
    (a) x + y
    (b) x - y
    (c) -x + y
    (d) -x − y
7. Decode the following ASCII message, assuming 7-bit ASCII characters and no parity:
    1001010 1000001 1001110 1000101 1000100 1001111 1000101
8. Assume that you have a 64-bit architecture, but you need to work with numbers that are up to 2^{4096}. Your available programming language can support 64-bit numbers. How would you design software to do this (Use a maximum of one to two paragraphs of 5-7 sentences each)?

For fun: If you have a probability of 1×10^{-6} (i.e., 1 in a million) that a bit error will happen in a 4 TB hard drive, then what is the probability that upon a read of one byte, any of those bits will be incorrect? (*Assume that each bit is independent of all other bits and all reads and writes are independent*).

2 Submission Requirements

The following requirements are for electronic submission via Canvas:
- Your solutions must be in a single file with a file name **yourname-hw2**
- Upload the file by following the link where you download the homework description on Canvas
- If the solution is scanned from a hand-written copy (for this assignment, you may use handwritten solutions), then the writing must be legible, or loss of credits may occur. If any disagreement over an answer occurs, I reserve the right for its final interpretation.
- **Only submissions in the designated location on Canvas are graded. Submissions in any other forms will be ignored.**