CS 231
Spring 2015
Homework #3

Due Monday, February 16

READ   Sections 2.4 – 2.4.2, 2.4.4; Sections 2.6, 2.6.1, 2.6.3, 2.6.4

DO   pp. 117-127   13, 16cd (not excess-127), 17 (not excess-127), 20abcd,
        21abcd, 23, 28b, 30, 55a, 58, and the following additional problems:

A. Convert…

        a) the following integers in binary notation to hexadecimal:

                110110100010;   1011; 1000010011.

        b) the following decimal notation to BCD:

                39; 204669; 9999.

        c) the following BCD notations to decimal notation:

                10010100; 10010000010; 100010010011.

B. Using 8-bit words, find the sign-magnitude, 1's complement, and 2's complement
representation for each of the following decimal integers:

        a) 113
        b) -67
        c) -64
        d) -13
        e) -1   *(Continued on next page)*

C. In Java, if you run the following code:

```
int x, y;
x = 2147483647;            // which is equal to  2^31 - 1
System.out.println("x = " + x);
y =   x+1;
System.out.println("x+1 = " + y);
```

you get the following output:

```
x = 2147483647
x+1 = -2147483648
```

(Try it if you wish.)

a) Why does this happen?
b) Based on this result: How many bytes does Java use to store an integer?   Explain.
c) Based on this result: Which representation does Java use for negative integers?
Explain.

D. Make up two 5-digit hexadecimal numbers and add them.

Reminder #1: At the end of each chapter, just before the exercises, there is a short
section titled "Review of Essential Terms and Concepts." I strongly urge you to look at
this section for each chapter that we cover, and be sure that you can answer any question
that refers to any concept that we discussed in class or that was referenced in an assigned
homework exercise.

Reminder #2: First exam is in class on Wednesday, February 18.