Thursday Reading Assessment: Chapter 2-8, 2-10 through 2-12

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1 Binary, Hexadecimal, BCD, and Gray Codes

1. Let $x_1 = 10110$. Show that taking the 2's complement of x_1 *twice* returns x_1.

2. Show that the range of 4-bit signed binary numbers in 2's complement form is $[-8, 7]$, assuming one sign bit.

3. Let $x_1 = F7_{16}$, and $x_2 = 9D_{16}$.
   (a) What is x_1 in binary?

   (b) What is x_2 in decimal?

4. Imagine a stream of binary digits coming through a serial line. They are: 1001...0001...0001. If we know the bitstream is in binary coded decimal (BCD), what is the code being sent?

5. What property of the four-bit gray code in Fig. 1 distinguishes it from straight binary counting?

TABLE 2–6

Four-bit Gray code.

Decimal	Binary	Gray Code	Decimal	Binary	Gray Code
0	0000	0000	8	1000	1100
1	0001	0001	9	1001	1101
2	0010	0011	10	1010	1111
3	0011	0010	11	1011	1110
4	0100	0110	12	1100	1010
5	0101	0111	13	1101	1011
6	0110	0101	14	1110	1001
7	0111	0100	15	1111	1000

Figure 1: A four-bit binary gray code.

6. Convert 1010 (gray code) to binary, showing how the process works.

7. Circle all the following 4-bit BCD code word sequences below that have a *single-bit* error, assuming *even* parity:
   - 1 0011 0010
   - 0 1110 1010
   - 1 0111 1110 1000 1010