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

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September 9, 2021

1 Hexadecimal, BCD, and Gray Codes

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

   (b) What is x_2 in decimal?

2. 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?

3. Which of the following is an *invalid* BCD code?
   - A: 0001
   - B: 0101
   - C: 1000
   - D: 1010

4. 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.

5. Can you show how you would convert 1010 (gray code) to binary?

6. Observe Fig. 2 below, depicting the 4-bit BCD code. Observe how the parity bit causes *even* parity (even number of 1's), or *odd* parity (odd number of 1's). Circle all the following 4-bit BCD code words below that have a *single-bit* error, assuming the parity bit is even:

   - 100110010
   - 011101010
   - 10111111010001010

TABLE 2–8

The BCD code with parity bits.

Even Parity		Odd Parity	
P	**BCD**	***P***	**BCD**
0	0000	1	0000
1	0001	0	0001
1	0010	0	0010
0	0011	1	0011
1	0100	0	0100
0	0101	1	0101
0	0110	1	0110
1	0111	0	0111
1	1000	0	1000
0	1001	1	1001

Figure 2: Even and odd parity bits.