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Logic design (2016 spring)

Quiz # 1

Name:_____ID:_____

1. (30%+15%) Convert 455.1_9 to hexadecimal and then to binary.

   Ans:

   $$455.1_9 = 4\times 9^2 + 5\times 9^1 + 5\times 9^0 + 1\times 9^{-1} = 4\times 81 + 5\times 9 + 5 + 1/9 = 374\frac{1}{9}_{10}$$

   $$\frac{374}{16} = 23 \ldots 6$$

   $$\frac{23}{16} = 1 \ldots 7$$

   $$\frac{1}{16} = 0 \ldots 1$$

   $$1/9\times 16 = 1\frac{7}{9}$$

   $$7/9\times 16 = 12\frac{4}{9}$$

   $$4/9\times 16 = 7\frac{1}{9}$$

   $$455.1_9 = 176.\underline{1C7}_{16} = 1\ 0111\ 0110.\underline{0001\ 1100\ 0111}_2 = 1\ 0111\ 0110.\underline{000111}_2$$

2. (40%) Subtract each of the following pairs of 5-bit 1's complement numbers by adding the complement of the subtrahend to the minuend and indicate when an overflow occurs.

   (a) (20%) $10101 - 01001$

   (b) (20%) $01101 - 11101$

   (a)

   $$\begin{array}{r} 10101 \\ +\ \underline{10110} \\ (1)01011 \\ \quad\ \underline{\quad\ 1} \\ 01100 \end{array}$$

   Overflow

   (b)

   $$\begin{array}{r} 01101 \\ +\ \underline{00010} \\ 01111 \end{array}$$

3. (15%) What number does 11010111 represent in a 6-2-2-1 weighted code for decimal digits?

   95