National Chung Cheng University
Department of Electrical Engineering
Logic Design, Fall 2016

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Quiz #1 Solutions

1. Express the following number in **octal**:

   $(2DA)_{16}$ (10%)

   Solutions:

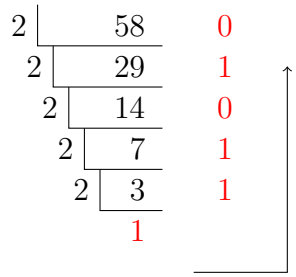
   $(2DA)_{16} = (0010 \quad 1101 \quad 1010)_2 = (001 \quad 011 \quad 011 \quad 010)_2 = (1332)_8$

2. Express the following number in **binary**:

   $(58.25)_{10}$ (10%)

   Solutions:

   $(58.25)_{10} = (111010.01)_2$



$$\begin{array}{r} 0.25 \\ \times \quad 2 \\ \hline 0.5 \\ \times \quad 2 \\ \hline 1.0 \end{array}$$

3. Represent the decimal numbers **5,623** in:

(a) BCD code (10%)

Solutions:

$(5623)_{10} = (0101 \quad 0110 \quad 0010 \quad 0011)_{BCD}$
5 6 2 3

(b) Excess-3 code (10%)

Solutions:

$(0101 \quad 0110 \quad 0010 \quad 0011)_{BCD}$
+3 +3 +3 +3

$= (1000 \quad 1001 \quad 0101 \quad 0110)_{Excess-3}$

(c) 2421 code (10%)

Solutions:

$(5623)_{10} = (1011 \quad 1100 \quad 0010 \quad 0011)_{2421}$

4. Determine the base of the numbers in each case for the following operations to be correct.

$(14)_a + (13)_a = (32)_a$ (10%)

Solutions:

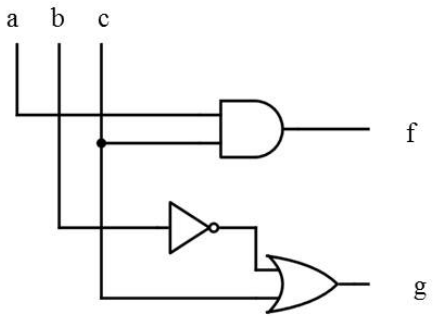
(a $\times$ 1 + 4)+(a $\times$ 1 + 3)=(a $\times$ 3 + 2)
a = 5

5. Convert decimal +9 and +5 to binary, using the signed-2's-complement representation and enough digits to accommodate the numbers. Then perform the binary equivalent of (-9)+(5). Convert the answers back to decimal and verify that they are correct. (20%)

Solutions:

$(5)_{10} = (00101)_2$ or $(00000101)_2$
$(9)_{10} = (01001)_2$ or $(00001001)_2$
$(01001)_2 \Rightarrow$ 2's = $(10111)_{2's}$
$(5)_{10} + (-9)_{10} = (00101)_2 + (10111)_{2's} = (11100)_{2's} = (-4)_{10}$
$(00100)_2 = (4)_{10}$

6. List the truth table of the logic diagram. (20%)



$f = ac$
$g = \overline{b} + c$

a	b	c	f	g
0	0	0	0	1
0	0	1	0	1
0	1	0	0	0
0	1	1	0	1
1	0	0	0	1
1	0	1	1	1
1	1	0	0	0
1	1	1	1	1