Solutions - Quiz 2

(February 11th @ 5:30 pm)

PROBLEM 1 (40 PTS)

- Complete the following table. Use the fewest number of bits in each case.

REPRESENTATION			
Decimal	**Sign-and-magnitude**	**1's complement**	**2's complement**
-8	11000	10111	1000
-4	1100	1011	100
6	0110	0110	0110
-9	11001	10110	10111

- Convert the following decimal number to its 2's complement representation: -9.75 (5 pts)

  $9.75 = 01001.11_2 \rightarrow -9.75 = 10110.01_2$

PROBLEM 2 (20 PTS)

- Perform the following operation in the 2's complement system, i.e., provide the summands and the result in 2's complement representation (indicate the carries). Use the minimum number of bits to represent both the summands and the result so that the overflow bit is 0.

  ✓ -11 + 16

n = 6 bits
$c_6 \oplus c_5 = 0$
No Overflow

	c_6=1	c_5=1	c_4=0	c_3=0	c_2=0	c_1=0	c_0=0	
-11 =	1	1	0	1	0	1		+
+16 =	0	1	0	0	0	0		
-25 =	0	0	0	1	0	1		

$-11 + 16 = 5 \in [-2^5, 2^5-1] \rightarrow$ no overflow

PROBLEM 3 (40 PTS)

- Complete the timing diagram of the circuit shown below: $y = y_3y_2y_1y_0$, $x = x_1x_0$