Solutions - Quiz 2

(February 9th @ 5:30 pm)

PROBLEM 1 (40 PTS)

- Complete the following table:

REPRESENTATION			
Decimal	**Sign-and-magnitude**	**1's complement**	**2's complement**
-10	11010	10101	10110
6	0110	0110	0110
-5	1101	1010	1011
-7	1111	1000	1001

- Convert the following decimal number to its 2's complement representation: -7.75 (5 pts)
  $7.75 = 0111.11_2 \rightarrow -7.75 = 1000.01_2$

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.
  - ✓ -14 + 21

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	
-14 =	1	1	0	0	1	0		+
+21 =	0	1	0	1	0	1		
+7 =	0	0	0	1	1	1		

$-14 + 21 = +7 \in [-2^5, 2^5-1] \rightarrow$ no overflow

PROBLEM 3 (40 PTS)

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