ICS Assignment 3

Name: _____ ID: _____

1. (B)In two's complement addition, if there is a final carry after the left most column addition, _____.

   (A) add it to the right most column (B) discard it
   (C) discord it (D) increase the bit length

2. (A)In two's complement representation with a 4−bit allocation, we get _____ when we add 1 to 7.

   (A) −8 (B) 8 (C) -7 (D) 1

3. (C)We use a bit pattern called a _____ to modify another bit pattern.

   (A) carry (B) float (C) mask (D) byte

4. (D)The _____ method of integer representation is the most common method for sorting integers in computer memory.

   (A) one's complement (B) sign-and-magnitude (C) unsigned integers
   (D) two's complement

5. (A)If we are adding two numbers, one of which has an exponent value of 7 and the other an exponent value of 9, we need to shift the decimal point of the smaller number _____.

   (A) two places to the left (B) two places to the right (C) one place to the right
   (D) one place to the left

6. What is the difference between simple and arithmetic shifts?
   Sol:
   The logical shift operation is applied to a pattern that does not represent a signed number. The arithmetic shift operation assumes that the bit pattern is a signed number in two's complement format.

7. We need to set (force to 1) the four rightmost bits of a pattern. Show the mask and the operation.
   Sol:
   Mask = $(00001111)_2$
   Operation: Mask OR $(xxxxxxxx)_2 = (xxxx1111)_2$

8. What binary operation can be used to unset bits? What bit pattern should the mask have?
   Sol:
   The AND operator can be used to clear bits. Set the desired positions in the mask to 0.

9. Show the result of the following operations:

   (a) NOT $(CF)_{16}$

   (b) $(FF)_{16}$ AND $(77)_8$ (Answer with the hexadecimal system)

   (c) $(99)_{16}$ OR $(01)_{16}$

   (d) $[(99)_{16}$ AND $(42)_{16}]$ OR $[(00)_{16}$ AND $(25)_{16}]$

   Sol:

   (a) NOT $(CF)_{16}$ = NOT $(11001111)_2 = (00110000)_2 = (30)_{16}$

   (b) $(FF)_{16}$ AND $(77)_8 = (11111111)_2$ AND $(00111111)_2 = (00111111)_2 = (3F)_{16}$

   (c) $(99)_{16}$ OR $(01)_{16} = (10011001)_2$ OR $(00000001)_2 = (10011001)_2 = (99)_{16}$

   (d) $(99)_{16}$ AND $(42)_{16} = (10011001)_2$ AND $(01000010)_2 = (00000000)_2$
   $(00)_{16}$ AND $(25)_{16} = (00000000)_2$ AND $(00100101)_2 = (00000000)_2$
   $[(99)_{16}$ AND $(42)_{16}]$ OR $[(00)_{16}$ AND $(25)_{16}] = (00000000)_2$ OR $(00000000)_2 = (00)_{16}$

10. What is the result of adding an integer to its two's complement?
    Sol:
    The result is a number with all 0's which has the value of 0.
    For example, if we add number $(10110101)_2$ in 8−bit allocation to its two's complement $(01001011)_2$ we obtain

										Decimal equivalent
1	1	1	1	1	1	1	1		Carry	
	1	0	1	1	0	1	0	1		-74
+	0	1	0	0	1	0	1	1		+74
	0	0	0	0	0	0	0	0		0

    We use this fact in normal mathematical calculation in the computers.

11. Show the result of the following operations assuming that the numbers are stored in 16−bit two's complement representation. Show the result in hexadecimal notation.

    (a) $(712A)_{16} - (9E00)_{16}$

    (b) $(E12A)_{16} + (9E27)_{16}$

    Sol:

    (a) The two's complement of $(9E00)_{16} = (0110001000000000)_2$

																		Hexadecimal
	1	1															Carry	
	0	1	1	1		0	0	0	1	0	0	1	0	1	0	1	0	712A
+	0	1	1	0		0	0	1	0	0	0	0	0	0	0	0	0	$\overline{9E00}+1$
	1	1	0	1		0	0	1	1	0	0	1	0	1	0	1	0	D32A

    (b)

																		Hexadecimal
	1									1		1	1	1			Carry	
	1	1	1	0	0	0	0	1	0	0	1	0	1	0	1	0		E12A
+	1	0	0	1	1	1	1	0	0	0	1	0	0	1	1	1		9E27
	0	1	1	1	1	1	1	1	0	1	0	1	0	0	0	1		17F51

    Note that the result is not valid because of overflow.