Introduction to Computing – Fall 2012

Assignment # 3

Submission Deadline: **Thursday, 6th December 2012**

Instructions

- **This is an individual assignment. You are not allowed to work/submit in form of group. There will be a viva of each student on the next day (Friday) about this assignment.**
- Only **handwritten** assignments will be accepted.

1. Fill the following table with appropriate values. You must show complete working for each conversion, to get full credit.

Radix 2	Radix 4	Radix 8	Radix 10	Radix 16
101001				
	10101			
		1010		
			1001	
				101

2. Perform the following operations in Binary Arithmetic (use **8-bit 2's complement** to represent negative values), then convert your binary answer into decimal:
   i. 1000100 / 10
   ii. 101 * 100
   iii. 1010 + 1110
   iv. 1100 – 1001
   v. 1001 – 1110

3. Assuming **8-bit** capacity, compute the decimal value for each of the following **unsigned** binary numbers:
   00011101 10001000 11111111 10000000 00000000

4. Assuming **8-bit** capacity, compute the decimal value for each of the following **signed** binary numbers (in 2's complement system):
   00011101 10001000 11111111 10000000 00000000

5. Convert the following decimal values into **signed** binary and use binary operations for solving them (assume **8-bit** capacity) [Hint: remember that division of both integers gives integer result]

75 / 5	75 / 3	8 / 3	20 / 3	84 / 5
3 * 8	17 * 4	- 7 * 3	(-5) * (-4)	8 * (-2)
120 + 120	130 + 130	(-3) + (54)	(-2) + (-5)	2 - 7

6. Convert the following hexadecimal values into octal, without using decimal number system:
   F10 A09 1BC 10 100

7. Convert the following octal values into hexadecimal, without using decimal number system:
   100 70 201 1010 77

8. Let there be a special counting system with the symbol set {**a, e, i, o, u**}. Answer the following questions about this system:
   i. What is the radix (base) of this system?
   ii. What is the decimal equivalent of the number 'oai' in this system?
   iii. What is the equivalent in this system for the decimal value 23?

9. Perform the following operations (in binary arithmetic) assuming **6 bit** 2's complement representation:
   100101 + 010110
   Also convert the result to decimal. Show your working to get full credit.

10. Perform the following operations (in binary arithmetic) on the following **unsigned** binary numbers. Show your working to get full credit.
    1001011 ÷ 11

11. Represent the following numbers using **8-bit** 2's complement system:
    a) 25
    b) -123

12. Each of the following **bytes** represents a number using 2's complement system. Convert them into equivalent decimal numbers.
    a) 10101010_2
    b) 01101010_2

13. Perform the following subtraction using **8-bit 2's complement** system
    a) 44 – 33
    b) 127 – 115
    c) 127 – 127
    d) 33 – 115

14. Calculate the base.

a) $(213)_x = (39)_{10}$
b) $(169)_x = (361)_{10}$
c) $\dfrac{(533)_x}{(3)_x} = (151)_x$
d) $(765)_x * (31)_8 = (30355)_8$
e) $\dfrac{(B90)_x}{(5A0)_x} = (2)_{10}$

15. Fill in the following table of complements: (Examples are given for illustration)

Sr#	Radix	Digits	Value	Padded Value	**Answer**
1.	10	3	13	013	**987**
2.	16	3	9E	09E	**F62**[1]
3.	10	4	51		
4.	16	2	7		
5.	8	3	21		
6.	8	5	21		
7.	2	4	101		
8.	2	6	11010		
9.	2	8	101		
10.	2	8	1		

16. Fill in the following table of complements: (also show your working)

Sr #	Binary	Signed/Unsigned	# of bits	Decimal
1.	1110	S	4	
2.	1110	U	4	
3.	1110	S	8	
4.	10101110	S	7	
5.	10101110	U	8	

17. Write down the ASCII code in binary, decimal and hexadecimal systems for the following symbols: (please consult appendix in your textbook, Discovering Computers 2010)

    A, B, C, X, Y, Z, a, b, c, x, y z, 0, 1, 9, +, -, /, *, space, backspace, escape, tab

18. What is numerical difference between the ASCII codes of:
    (a) A and a (b) Z and z (c) 0 and 9

19. Fill the following table with appropriate values. You must show complete working for each conversion, to get full credit. Then write 32-bit representation of each of the following value.

Radix 2	**Radix 10**	**Radix 16**
	7.75	
11001.001		
1110000.01		
		A7.4
		1F.C8

[1] Since F_{16} is a number so F – 0 → F; and F_{16} means 15_{10} so F – 9 → 6, and E_{16} is 14_{10} so F – E → 1.
And since R's complement requires addition of 1 so F61 + 1 → F62

20. Build the Truth Table for the following logical expressions (also include columns to show intermediate steps):

    (i) not a or b
    (ii) not (a or b)
    (iii) a and b or c
    (iv) a and (b or c)
    (v) a xor b xor c
    (vi) a xor not b and c

Problem Solving Portion

21. Write pseudo-code (only use the wording of flow-chart, without diagram) of all the programs of previous programming assignments, and home work of Looping programs. Use curly braces to enclose a block of code [discuss this during the lecture in next week, if you do not understand it].

☺ GOOD LUCK! ☺

Remember: Honesty always gives fruit (no matter how frightening is the consequence); and Dishonesty is always harmful (no matter how helping it may seem in a certain situation)!

NOTE:
There will be a **grand quiz** of Chapter 1 to 7 and Office tools, on Friday. This grand quiz may compensate your poor performance in corresponding portion of previous quizzes.