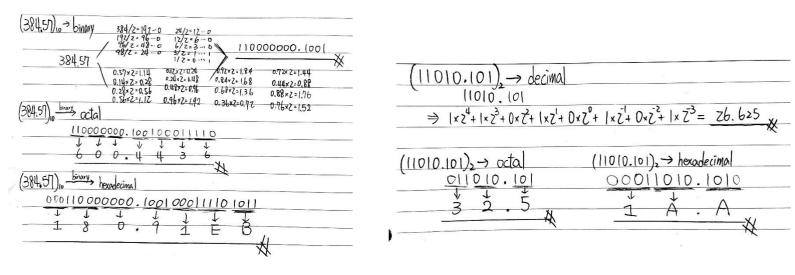
HW1

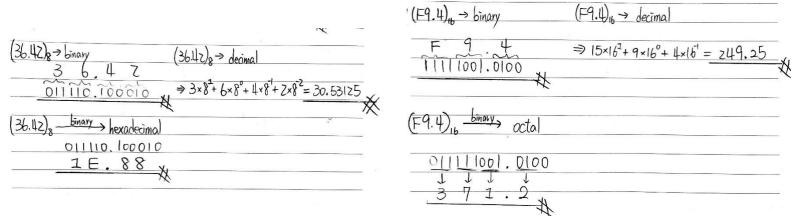
1. (8%) What is the exact number of bits in a system that contains (a) 16M byte and (b) 8.3G byte?

(a) 16M Byte = $16 * 2^20 * 2^3$ => 134,217,728(b) 8.3G Byte = $8.3 * 2^30 * 2^3(71,296,457,113.6)$ => 71,296,457,114

2. (24%) Convert the following numbers from the given base to other three bases listed in the table:

Decimal	Binary	Octal	Hexadecimal
384.57	110000000.1001	600.4436	180.91EB
26.625	11010.101	32.5	1A.A
30.53125	11110.10001	36.42	1E.88
249.25	11111001.01	371.2	F9.4





3. (16%) Perform the subtraction with the following unsigned binary numbers by taking the 2's complement of the subtrahend. (a) 0111 – 0110, (b) 10010 – 1010, (c) 1010110 – 1111010, (d) 101101 – 110.

(α)	(6)
00 0111	001 0010
+111010	+1110110
	<u></u>
00101 0110	00101101
+110000110	+11111010
111011100	00100111

4. (16%) Convert decimal +47 and +38 to binary, using the signed-2's-complement representation and enough digits to accommodate the numbers, Then, perform the binary equivalent of (+47)+(-38) and (-47)+(-38) using addition. Convert the answers back to decimal and verify that they are correct.

$47_{(10)} = 00 0_{-1 1 _{(2)}}$ $38_{(10)} = 00 0_{-0 10_{(2)}}$	$-47_{(\omega)} = 10 _{000} _{10}$ $-38_{(\omega)} = 10 _{000} _{10}$
	(1010001-474)
+ 11011010 -38(10)	+ 11011010 -38/10
carry out w/o overflow sum is correct	10101011 -85(10)
carry out w/o overtlow sum is correct	carryout w/o overflow sum is correct

5. (10%) Write the word "Logic" in ASCII using an eight-bit code including the space. Treat the leftmost bit of each character as a parity bit. Each 8-bit code should have even parity.

 $\begin{array}{ccc} & \downarrow & & \downarrow & \\ L : & 1100 \ 1100 \\ o : & 0110 \ 1111 \\ g : & 1110 \ 0111 \\ i : & 0110 \ 1001 \end{array}$

c: 0110 0011

- 6. (8%) For an 8-bit sequence is 1101 0111. What is its content if it represents (a) two decimal digits in BCD? (b) two decimal number in the Excess-3 code? (c) an 8-bit unsigned number? (d) an 8-bit signed number?
 - a. $1101_{(2)} = unused_{(10)}$ $0111_{(2)} = 7_{(10)}$
 - b. $1101_{(2)} = unused_{(10)}$ $0111_{(2)} = 4_{(10)}$
 - c. $1101\ 0111_{(2)} = 215_{(10)}$
 - d. $1101\ 0111_{(2)} = -41_{(10)}$
- 7. (6%) If you have 27 books and want to give each book a unique id with a binary number. If we want to use as least as possible the number of bits as the id, how many bits do you need?

 $27\ unique\ IDs$ which means the number of bits you need could at least represent $27\ unique\ numbers$.

$$2^5 > 27 > 2^4$$

Ans: 5 bits

8. (12%) Find the Gray code sequence of 12 code words.

M=>k=12, k=6				
	3	$(g_3 = 0)$ (MSB = 0)		
D	d=d2d1d0 93 92 91 90	$g_{3}=d_{3}\oplus d_{2}=0\oplus 0=0$		
0	0000 -> 0000	9,=d=01=000=0		
1	0001-0001	90 = d1 & d0 = 0 & 0 = 0		
2	0010 -> 0011			
3	0011->0010			
4	0100-0110			
5	0101-0111			
		For the rest half codes		
6	$0/10 \rightarrow 1/1/1$	set MSB=1		
7	$0111 \rightarrow 1110$	then copy in neverse order of		
8	1000-1010	first holf part!		
9	1001-1011			
10	1010-1001			
//	1011-1000	•		
	8			