Course Name: Computer Architecture

Course Number and Section: **14:332:333:03**

Experiment: Introduction, GitHub tutorial, Number representation [Lab 1]

Lab Instructor: Christos Mitropoulos

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Submitted by: Vancha Verma 173004061

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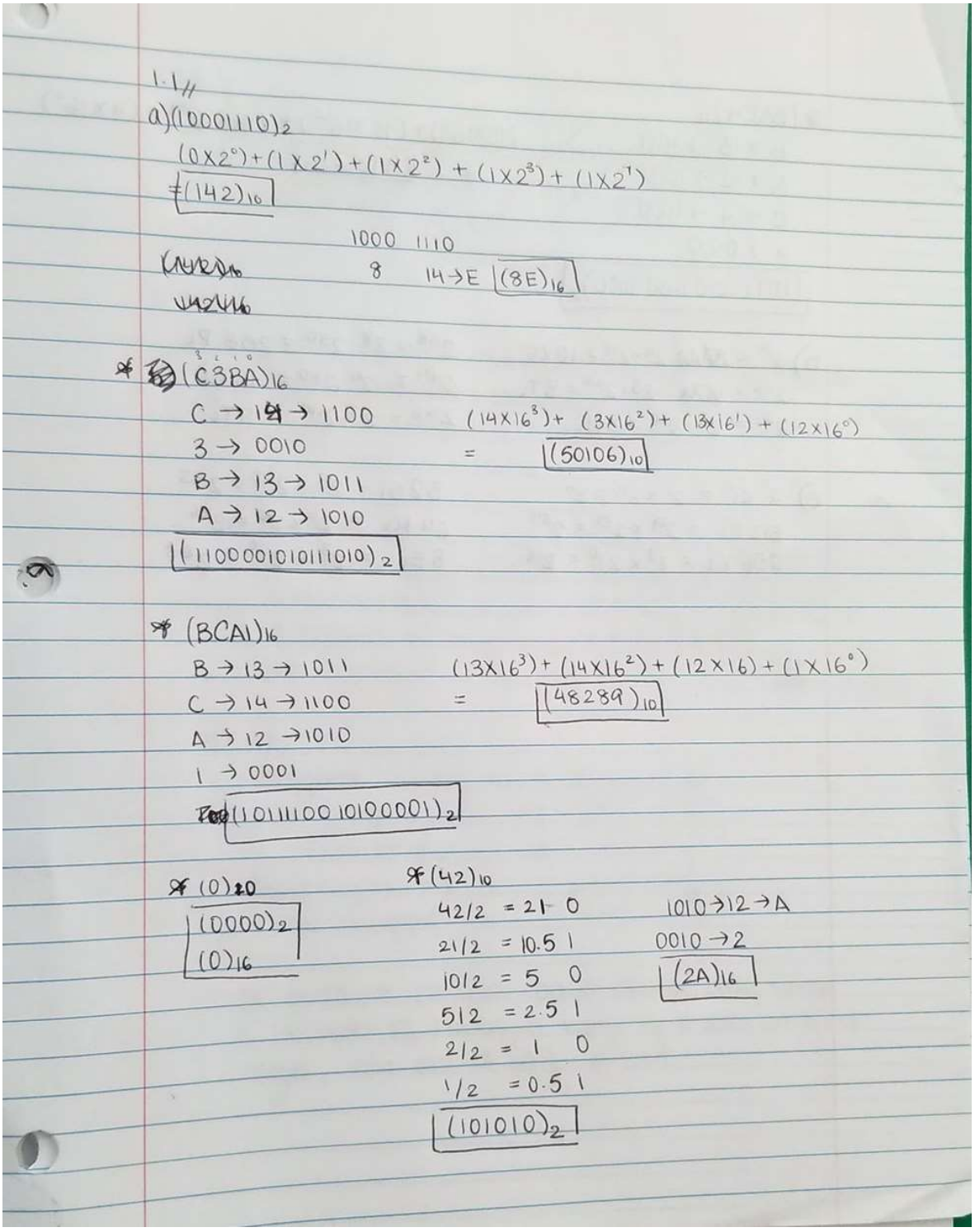
GRADE: _____

COMMENTS:


1.1//
a)(10001110)2
(0X2°)+(1X2')+(1X2²)+(1X2³)+(1X2⁷)
=(142)16
1000 1110
8 14→E (8E)16
(C3BA)16
C → 12 → 1100
3 → 0010
B → 13 → 1011
A → 12 → 1010
(1100001010111010)2
(14X16³)+(3X16²)+(13X16')+(12X16°)
= (50106)10
(BCA1)16
B → 13 → 1011
C → 14 → 1100
A → 12 → 1010
1 → 0001
(1011110010100001)2
(13X16³)+(14X16²)+(12X16)+(1X16°)
= (48289)10
(0)10
(0000)2
(0)16
(42)10
42/2 = 21 0
21/2 = 10.5 1
10/2 = 5 0
5/2 = 2.5 1
2/2 = 1 0
1/2 = 0.5 1
(101010)2
1010→12→A
0010→2
(2A)16

a) $(BAC4)_{16}$

B → 13 → 1011

A → 12 → 1010

C → 14 → 1100

4 → 0100

$(1011\ 1010\ 1100\ 0100)_2$

$(13\times16^3)+(12\times16^2)+(14\times16^1)+(4\times16^0)$

$= (47812)_{10}$

b) $2^{14} = 2^4 \cdot 2^{10} = 16\,Ki$

$2^{43} = 2^3 \cdot 2^{40} = 8\,Ti$

$2^{23} = 2^3 \cdot 2^{20} = 8\,Mi$

$2^{58} = 2^8 \cdot 2^{50} = 256\,Pi$

$2^{64} = 2^4 \cdot 2^{60} = 16\,Ei$

$2^{42} = 2^2 \cdot 2^{40} = 4\,Ti$

c) $2\,Ki = 2^1 \times 2^{10} = 2^{11}$

$512\,Pi = 2^9 \times 2^{50} = 2^{59}$

$256\,Ki = 2^8 \times 2^{10} = 2^{18}$

$32\,Gi = 2^5 \times 2^{30} = 2^{35}$

$64\,Mi = 2^6 \times 2^{20} = 2^{26}$

$8\,Ei = 2^3 \times 2^{60} = 2^{63}$

2.211

1) Largest 8 bit integer

└ Two's complement: $(0111\ 1111)_2 \rightarrow (127)_{10}$

└ unsigned: $(1111\ 1111)_2 \rightarrow (255)_{10}$

2) 0, 3, -3

unsigned

$0 \rightarrow (0000)_2 \rightarrow (0000\ 0000)_2$

$3 \rightarrow (0011)_2 \rightarrow (0000\ 0011)_2$

-3 → cannot be unsigned b/c its a neg #

two's complement

$0 \rightarrow (0000)_2 \rightarrow (0000\ 0000)_2$

$3 \rightarrow (0011)_2 \rightarrow (0000\ 0011)_2$

$-3 \rightarrow 0011 \rightarrow 1100$

$+1$

1101

$(1111\ 1101)_2$

3) 42, -42

unsigned	two's complement
$42 \rightarrow (101010)_2$	$42 \rightarrow \boxed{(0010\ 1010)_2}$
$\rightarrow \boxed{0010\ 1010)_2}$	$-42 \rightarrow 1101\ 0101$
$-92 \rightarrow$ neg #s can't be unsigned.	$+1$
	$\boxed{1101\ 0110)_2}$

4) Not possible as you could choose any range. ie, instead of having a range of 0-255 for 8 bit integer, you could say 10-265

5// let $x = 0001$

$\bar{x}+1 = 1110$

$+1$

1111

$$\begin{array}{r} {\scriptstyle 1\ 1\ 1} \\ 0001 \\ 1111 \\ \hline 0000 \end{array}$$

As seen above, the two's complement added to the orignal is 0.

6// Decimal → since humans have 10 fingers, decimal is the easiest to count & calculate in.

Binary → used for computers as there is no range to confuse the computer. If there is a signal = 1, no signal = 0.

Hex → short hand way to represent binary. It can represent 4 binary bits in one digit.

~~8~~// 3.1//

1) 2 2.28 3.0