Assignment 3

3.1

5ED4

5ED4 $\xrightarrow{\text{convert}}$ 0101 1110 1101 0100

07A4

07A4 → 0000 0111 1010 ~~1101~~ 0100

5ED4		0101	1110	1101	0100
− 07A4	−	0000	0111	1010	0100
		0101	0111	0011	0000

5730

3.2

5ED4 − 07A4

i.e. 5ED4 + (−07A4)

5ED4		0101	1110	1101	0100
−07A4		+1111	1000	0101	1100
5730	1	0101	0111	0011	0000

Overflow

3.3 5ED4 ⟶ Binary

0101 1110 1101 0100

Hexadecimal system is very important because the primary representation of memory address in computers as modern computers operate at a base of 16, for eg 64 bit so 16 * 4.

This makes representation accurate & easy. Big numbers can be represented ~~in~~ FFFFF which is equivalent to 1048574. So hex saves letters.

3.8

185 → 10111001 $\xrightarrow{\text{negate}}$ 0100 0110

2	185	
	92	1
	46	0
	23	0
	11	1
	5	1
	2	1
	1	0
	0	1

LSB ↑ MSB

122 → ~~1111~~ ~~112~~ 01111010

2	122	
	61	0
	30	1
	15	0
	7	1
	3	1
	1	1
	0	1

↑ MSB

We add 1

  0100 0111
+ 0111 1011

~~1100 0000~~

1100 0010

Since signed 8-bit integers range is
−128 ~ 127

classmate
Date
Page

3.9)

2's complement

151 → 1001 0111 → 0110 1000

2	151	
	75	1
	37	1
	18	1
	9	0
	4	1
	2	0
	1	0
	0	1

214 → 1101 0110 → ~~0010 1001~~

0010 1001

2	214	
	107	0
	53	1
	26	1
	13	0
	6	1
	3	0
	1	1
	0	1

~~151 →~~

Scanned by CamScanner

 Jas 3,9

Adding H

$(151)_{2's} \longrightarrow 01101001$

$(214)_{2's} \longrightarrow 00101010$

Now adding

$$
\begin{array}{r}
01101001 \\
+\ 00101010 \\
\hline
10010011 \\
\hline
\end{array}
$$

$2^7 \times 1 + 0 \times 2^6 + 0 \times 2^5 + 1 \times 2^4 + 0\, 2^3 + 0\, 2^2 + 2^1 + 2^0 \times 1$

$= 2^7 + 2^4 + 2 + 1$

$= \underline{147}$

classmate

Date
Page

3.10

$2's$ comp — Adding 1's

151 → 1001 0111 → 0110 1000 → 0110 1001

214 → 1101 0110 → 0010 1001 → (-) 0010 1010

0011 1110

$= 0\times2^7 + 0\times2^6 + 1\times2^5 \quad 2^4 + 2^3 + 2^2 + 2^1 + 2^0$

$= 2^5 + 2^4 + 2^3 + 2^2 + 2^1 + 0$

$= \underline{62}$

3.11

151 → 1001 0111 → 0110 1000

214 → 1101 0110 → 0010 1001

+

255   1111 1111

This is not required Bcoz we are using unsigned

As Question says unsigned, 255 is the highest number in range for unsigned.

3.20 pattern 0 x0C 000 000 $\boxed{2^s \text{complement}}$

let us convert this into Bin

0000 1100 0000 0000 0000 0000 0000 0000

Reversing 2's complemente

But since this number starts with 0000 it is positive

∴ 1100 0000 0000 0000 0000 0000.

Converting into Decimal.

$= 2^{256} \times 1 + 2^{128} \times 1 + 0 \ldots$

$= 201326592$

The Answer is the same for unsigned integer because the number happens to be +ve.

Date
Page

3.21) Instruction Register.

0C 000 000

0000 1100 0000 0000 0000 0000 0000 0000

opcode + target

~~(6 bits)~~ 6bits 26 bits

[31-25] [24-0]

00 0011 000000 0000000000 0000 0000 0000

From MIPS instruction sheet we recognise

000011 ⟶ JAL

So Jump instruction will be executed & program will jump to target address

3.22 0C 000000

0000 1100 0000 0000 0000 0000 0000 0000

As per IEEE 754 Floating Point Nos

$$FP = (-1)^S \times (1+F) \times 2^{(E-bias)}$$

Sign + Exponent + Fraction
S E F

0 000 11 000 000 0000 00000000 0000
0000

$$= (-1)^0 \times (1 + 0000000\ldots0) \times 2^{(24 - 127)}$$

$$= 1.0 \times 2^{(-103)}$$