Topic 4 and 5 – Binary conversion and Arithmetic (Due end of Week 5)

Binary Assignment 1 - Marking Scheme

1. Convert the following to Base 2 based on their respective bases

   a. $68\frac{5}{8}$ Base 10

128	64	32	16	8	4	2	1
	1	0	0	0	1	0	0

68 – 64 = 4 (1/2)

4 – 4 = 0

68 = 100100_2 (1/2)

5/8 = 0.625

$0.625 \times 2 = 1.25$

$0.25 \times 2 = 0.5$ (1/2)

$0.5 \times 2 = 1.0$

= $.101_2$

Ans = 10100.101_2 (1/2)

   b. 724_8

Number	Binary
0	000
1	001
2	010
3	011
4	100
5	101
6	110
7	111

(1)

7 – 111 2 – 010 4 – 100 (1/2)

Ans = 111010100_2 (1/2)

c. $D9B4_{16}$

Number	Binary
0	0000
1	0001
2	0010
3	0011
4	0100
5	0101
6	0110
7	0111
8	1000
9	1001
A	1010
B	1011
C	1100
D	1101
E	1110
F	1111

D – 1101 9 – 1001 B – 1011 4 – 0100

Ans = 1101100110110100_2

2. Convert from Base 2 to the respective bases

a. 1011011011 to base 10

512	256	128	64	32	16	8	4	2	1
1	0	1	1	0	1	1	0	1	1

512 + 128 + 64 + 16 + 8 + 2 + 1 = 731

Ans = 731_{10}

b. 111010101110 to base 8

111 010 101 110 (1)

7 2 5 6

Ans = 7256_8 (1)

c. 1111010001101110 to base 16

1111 0100 0110 1110 (1)

F 4 6 E

Ans = $F46E_{16}$ (1)

3. Calculate the following

a. $10111101_2 + 111101_2$

$$\begin{array}{r} 1\,0\,1\,1\,1\,1\,0\,1 \\ +\;\;1\,1\,1\,1\,0\,1 \\ \hline 1\,1\,1\,1\,1\,0\,1\,0 \end{array}$$ (1) (1)

b. $1101110_2 - 110110_2$

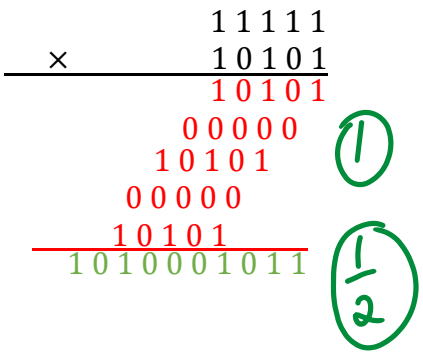
$$\begin{array}{r} 1\,1\,0\,1\,1\,1\,0 \\ -\;\;1\,1\,0\,1\,1\,0 \\ \hline 1\,0\,1\,0\,0\,1\,1 \end{array}$$ (1) (1)

c. $1101110_2 \div 1111_2$

$$\begin{array}{r} \quad\quad\quad 1\,1\,1 \\ 1111\overline{)\,1101110} \\ \quad\quad 1111 \\ \hline \quad\quad 11001 \\ \quad\quad\;\; 1111 \\ \hline \quad\quad\quad 10100 \\ \quad\quad\quad\;\; 1111 \\ \hline \quad\quad\quad\quad 101 \end{array}$$ (1/2) (1)

Ans = 111_2 rem 101_2 (1/2)

d. $11111_2 \times 10101_2$



Ans = 1010001011_2 1/2