START WRITING FROM HERE

2. Exercises on number Systems

2.1 Exercises (Number System conversions)

1. Convert the following decimal numbers into binary and hexadecimal numbers :

a. 108

2	108
2	54 - 0
2	27 - 0
2	13 - 1
2	6 - 1
2	3 - 0
2	1 - 1
	0 - 1

16	108
16	6 - 12 - C
	0 - 6

Hexadecimal : 6C

Binary : 1101100

b. 4848

2	4848
2	2424 - 0
2	1212 - 0
2	606 - 0
2	303 - 0
2	151 - 1
2	75 - 1
2	37 - 1
2	18 - 1
2	9 - 0
2	4 - 1
2	2 - 0
2	1 - 0
	0 - 1

16	4848
16	303 - 0
16	18 - 15 - f
16	1 - 2
	0 - 1

Hexadecimal : 12f0

Binary : 100101111000

ROLL NUMBER :

c. 9000

2	9000	
2	4500	0
2	2250	0
2	1125	0
2	562	1
2	281	0
2	140	1
2	70	0
2	35	0
2	17	1
2	8	1
2	4	0
2	2	0
2	1	0
	0	1

Binary : 10001100101000

16	9000	
16	562	8
16	35	2
16	2	3
	0	2

Hexadecimal : 2328

2. Convert the following binary numbers into decimal and hexadecimal numbers.

a. 10000000

$$1\ 0\ 0\ 0\ 0\ 0\ 0\ 0$$
$$2^7\ 2^6\ 2^5\ 2^4\ 2^3\ 2^2\ 2^1\ 2^0$$

$2^7 = 128$

Decimal : 128

16	128	
16	8	0
	0	8

Hexadecimal : 80

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1. Convert the following decimal numbers into binary and hexadecimal numbers :

a. 108

2	108	
2	54	0
2	27	0
2	13	1
2	6	1
2	3	0
2	1	1
	0	1

↑

16	108	
16	6	12 – C
	0	6

↑

Hexadecimal : 6C

Binary : 1101100

b. 4848

2	4848	
2	2424	0
2	1212	0
2	606	0
2	303	0
2	151	1
2	75	1
2	37	1
2	18	1
2	9	0
2	4	1
2	2	0
2	1	0
	0	1

16	4848	
16	303	0
16	18	15 – f
16	1	2
	0	1

Hexadecimal : 12f0

Binary : 100101111000

ROLL NUMBER :

c. 9000

2	9000	
2	4500	0
2	2250	0
2	1125	0
2	562	1
2	281	0
2	140	1
2	70	0
2	35	0
2	17	1
2	8	1
2	4	0
2	2	0
2	1	0
	0	1

Binary : 1000 1100 1010 1000

16	9000	
16	562	8
16	35	2
16	2	3
	0	2

Hexadecimal : 2328

2. Convert the following binary numbers into decimal and hexadecimal numbers.

a. 10000000

$$\begin{array}{cccccccc} 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 2^7 & 2^6 & 2^5 & 2^4 & 2^3 & 2^2 & 2^1 & 2^0 \end{array}$$

$2^7 = 128$

Decimal : 128

16	128	
16	8	0
	0	8

Hexadecimal : 80

ROLL NUMBER :

b. 10101010101 0

1 0 1 0 1 0 1 0 1 0 1 0

2^{11} 2^{10} 2^9 2^8 2^7 2^6 2^5 2^4 2^3 2^2 2^1 2^0

$= 2^1 + 2^3 + 2^5 + 2^7 + 2^9 + 2^{11}$

$= 2 + 8 + 32 + 128 + 512 + 2048$

$= 2730$

Decimal : 2730

16	2730	
16	170	- 10 - A
16	10	- 10 - A
	0	- 10 - A

Hexadecimal : AAA

c. 1000011000

1 0 0 0 0 1 1 0 0 0

2^9 2^8 2^7 2^6 2^5 2^4 2^3 2^2 2^1 2^0

$= 2^3 + 2^4 + 2^9$

$= 8 + 16 + 512$

$= 536$

Decimal : 536

16	536	
16	33	- 8
16	2	- 1
	0	- 2

Hexadecimal : 218

3. Convert the following hexadecimal numbers into binary and decimal numbers.

a. 1234

$4 \times 16^0 = 4$

$3 \times 16^1 = 48$

$2 \times 16^2 = 512$

$1 \times 16^3 = 4096$

$= 4096 + 512 + 48 + 4$

$= 4660$

Decimal : 4660

2	4660	
2	2330	- 0
2	1165	- 0
2	582	- 1
2	291	- 0
2	145	- 1
2	72	- 1
2	36	- 0
2	18	- 0
2	9	- 0
2	4	- 1
2	2	- 0
2	1	- 0

Binary : 1001000110100

b. 80F

8 × 16^2 = 2048
0 × 16^1 = 0
F - 15 × 16^0 = 15

= 2048 + 15
= 2063

Decimal : 2063

Binary : 100000001111

2	2063	
2	1031	- 1
2	515	- 1
2	257	- 1
2	128	- 1
2	64	- 0
2	32	- 0
2	16	- 0
2	8	- 0
2	4	- 0
2	2	- 0
2	1	- 0
	0	- 1

c. ABCDE

A - 10 × 16^4 = 655360
B - 11 × 16^3 = 45056
C - 12 × 16^2 = 3072
D - 13 × 16^1 = 208
E - 14 × 16^0 = 14

= 655360 + 45056 + 3072 + 208 + 14
= 703710

Decimal : 703710

Binary: 10101011111110 11110

2	703710	
2	351855	- 0
2	175927	- 1
2	87963	- 1
2	43981	- 1
2	21990	- 1
2	10995	- 0
2	5497	- 1
2	2748	- 1
2	687	- 1
2	343	- 1
2	171	- 1
2	85	- 1
2	42	- 1
2	21	- 0
2	10	- 1
2	5	- 0
2	2	- 1
2	1	- 0
	0	- 1

4. convert the following decimal numbers into binary equivalent.

a. 123.456 D

123

2	123	
2	61	- 1
2	30	- 1
2	15	- 0
2	7	- 1
2	3	- 1
2	1	- 1
	0	- 1

Binary : 1111011

0.456 D => 0.45613

0.45613 × 2	= 0.91226	carry 0
0.91226 × 2	= 0.82452	carry 1
0.82452 × 2	= 0.64904	carry 1
0.64904 × 2	= 0.29808	carry 1
0.29808 × 2	= 0.59616	carry 0

Binary : .01110

123.456 D Binary equivalent

=> 1111011.01110

b. 19.25 D

19

2	19	
2	9	- 1
2	4	- 1
2	2	- 0
2	1	- 0
	0	- 1

Binary : 10011

0.25 D => 0.2513

0.2513 × 2	= 0.5026	carry 0
0.5026 × 2	= 0.0052	carry 1
0.0052 × 2	= 0.0104	carry 0
0.0104 × 2	= 0.0208	carry 0
0.0208 × 2	= 0.0416	carry 0

Binary : .01000

19.25 D 's Binary equivalent is 10011.01000