Binary -> Decimal

1.) $(11001011)_2 \rightarrow (\ ?\ )_{10}$

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

$1 + 2 + 8 + 64 + 128 =$
$3 + 72 + 128 = (203)_{10}$

Hex to Binary

1 $0x45 \rightarrow (\ ?\ )_2 = (01000101)_2$

0	1	2	3	4	5	6	7
0000	0001	0010	0011	0100	0101	0110	0111

8	9	A 10	B	C	D	E	F
1000	1001	1010	1011	1100	1101	1110	1111

2. $0xFA \rightarrow (?)_2 = (11111010)_2$

3. $0x5D \rightarrow (?)_2 = (01011101)_2$

4. $0x99 \rightarrow (?)_2 = (10011001)_2$

5. $0x03 \rightarrow (?)_2 = (00000011)_2$

Two's Complement Practice

Decimal → 8-bit 2's complement → Hex

$(-39)_{10} \rightarrow (?)_{8\text{bit 2's comp.}} = (11011011)_{2\ 8\text{bit 2's comp}}$

$39 < 2^6$

1	0	0	1	0	1
32	16	8	4	2	1

$(00100101)_2 \leftarrow +x$

$(11011011)_2 \leftarrow -x$

$$\begin{array}{r} 1\ 1\ 1\ 1\ 1\ 1\ 1\ 1 \\ 0\ 0\ 1\ 0\ 0\ 1\ 0\ 1 \quad +x \\ +\ 1\ 1\ 0\ 1\ 1\ 0\ 1\ 1 \quad -x \\ \hline 1\ 0\ 0\ 0\ 0\ 0\ 0\ 0\ 0 \end{array}$$

$37 - 32 = 5 - 4 = 1 - 1 = 0$

$(11011011)_2 \rightarrow (?)_{16} \rightarrow (DB)_{16}$

0	1	2	3	4	5	6	7	8
0000	0001	0010	0011	0100	0101	0110	0111	1000

9	A (10)	B	C	D	E	F
1001	1010	1011	1100	1101	1110	1111

$(-39)_{10} + (92)_{10} \rightarrow (?)_{2s\ comp\ 8bit}$

$92 < 128$

1	0	1	1	0	0
64	32	16	8	2	1

$92 - 64 = 28$

$28 - 16 = 12 - 8 = 4 - 4 = 0$

$(92)_{10} \rightarrow (01011100)_{2s\ comp\ 8bit}$

$$\begin{array}{r} 1\ 1\ 1\ 1 \\ 11011011 \\ +\ 01011100 \\ \hline 101110111 \end{array}$$

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

$(-39)_{10} + (92)_{10} \rightarrow (10111011)_{2s\ comp\ 8bit}$

Overflow