Lab 1a - Negative Numbers

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CSC-17a

127_{10}

① $127_{10} = 127 \% 16 = 15 \rightarrow F = 7F_{16}$
$\text{int}(\frac{127}{16}) \% 16$
$7 \% 16 = 7$

② $7F_{16} = 01111111_2$

③ 10000000
$+1$

④ $10000001_2 = -127_{10}$

① base 10 → base 16

② base 16 → base 2

③ 1's complement (flip bits)

④ 2's complement

$$\begin{array}{r} 127_{10} \\ +-127_{10} \\ \hline 0 \end{array} \qquad \begin{array}{r} 01111111 \\ +\ 10000001 \\ \hline 00000000 \end{array}$$ ✓

$$-127_{10} = 10000001_2$$

$10101_2 = 00010101_2$

① 00010101

② 11101010 → 1's complement
$+1$

③ 11101011 → 2's complement

$$\begin{array}{r} 00010101 \\ +\ 11101011 \\ \hline 00000000 \end{array}$$ ✓

$$-00010101_2 = 11101011_2$$

71_8

① 00111001

② 11000110
$+1$

③ 11000111

$$\begin{array}{r} 00111001 \\ +\ 11000111 \\ \hline 00000000 \end{array}$$ ✓

$$-71_8 = 11000111_2$$

AB_{16}

$$\begin{array}{r} 15\ 15 \\ -A\ -B \\ \hline 5\ 4_{16} \end{array}$$

① 54_{16}
$+1$

② $55_{16} = 01010101$

not 1
add more bits
make leading bit a 1

① 1's comp
② 2's comp

$$-AB_{16} = 10000000\,01010101_2$$