- Why binary : simple

- $167 = 128+32+4+2+1 = 2^7+2^5+2^2+2^1+2^0 = (10100111)_2$

- bit: "binary digit" 8 bits: byte 4 bits: nybble

- We use base 16 to easily translate into binary in computer organization

  Base 16 has 16 digits

  easy to convert a hex number to binary. e.g: 9AE = 1001 1010 1110 3FF = 0011 1111 1111 = 1023_{10}

Addition & Subtraction

$$\begin{array}{r} 5_{10} \\ +\ 6_{10} \\ \hline 11_{10} \end{array} \qquad \begin{array}{r} 0101 \\ +0110 \\ \hline 1011 \end{array} \qquad \begin{array}{r} 3A2 \\ +168 \\ \hline 50A \end{array}$$

$$\begin{array}{r} 8 \\ -\ 3 \\ \hline 5 \end{array} \qquad \begin{array}{r} 1000 \\ -0011 \\ \hline 0101 \end{array}$$

- We don't substract → instead we add a negative number (easier)

  In binary. we use 2's complement to represent negative & positive numbers