

1) Decimal to binary

a) 13

$$\begin{array}{r} 128 \ 64 \ 32 \ 16 \ 8 \ 4 \ 2 \ 1 \\ 0 \ 0 \ 0 \ 0 \ 1 \ 1 \ 0 \ 1 \end{array} \rightarrow [1101]$$

$$\begin{array}{r} 13 \ 5 \\ 6- \ \underline{4} \\ \hline 5 \end{array}$$

b) 44

$$\begin{array}{r} 128 \ 64 \ 32 \ 16 \ 8 \ 4 \ 2 \ 1 \\ 0 \ 0 \ 1 \ 0 \ 1 \ 1 \ 0 \ 0 \end{array} \rightarrow [00101100]$$

$$\begin{array}{r} 44 \ 12 \\ 32- \ \underline{8} \\ \hline 12 \ 4 \end{array}$$

2) Binary to decimal : 1010110

$$\begin{array}{r} 128 \ 64 \ 32 \ 16 \ 8 \ 4 \ 2 \ 1 \\ 0 \ 1 \ 0 \ 1 0 \ 1 1 0 \end{array} \rightarrow \begin{array}{r} 1 \\ 64 \\ 16 \\ 4 \\ 2+ \\ \hline 86 \end{array}$$

$$3) 10100 + 00111 \quad 4) 0 \times 66 + 0 \times 75$$

$$\begin{array}{r} 1 \\ 10100 \\ 00111+ \\ \hline 11011 \end{array} \rightarrow [11011]$$

$$\begin{array}{r} 66 \\ 75+ \\ \hline 0 \times DB \end{array} \quad \begin{array}{l} 11 \rightarrow B \\ 13 \rightarrow D \end{array}$$

$$5) P = 0 \times 1234 \quad Q = 0 \times ABCDEF$$

a) P + Q

$$\begin{array}{r} 1 \ 1 \\ 1234 \\ A B E F + \\ \hline 6 \times BE23 \end{array}$$

$$\begin{array}{r} 15 \\ 4+ \\ \hline 19 \end{array}$$

$$\begin{array}{r} 14 \\ 3+ \\ \hline 17 \end{array}$$

$$\begin{array}{r} 1 \\ 17 \\ 1+ \\ \hline 18 \end{array}$$

$$\begin{array}{r} 1 \\ 18 \\ 16- \\ \hline 2 \end{array}$$

$$\begin{array}{r} A \rightarrow 10 \\ B \rightarrow 11 \\ C \rightarrow 12 \\ D \rightarrow 13 \\ E \rightarrow 14 \\ F \rightarrow 15 \end{array}$$

b) P - Q

$$P + (-Q) :$$

$$-Q : 15 - 10 = 5$$

$$15 - 11 = 4$$

$$15 - 14 = 1$$

$$15 - 15 = 0$$

$$\begin{array}{r} 1234 \\ 5411+ \\ \hline 0 \times 6645 \end{array}$$

$$\begin{array}{r} 5410 \\ 1+ \\ \hline 5411 \end{array}$$

$$6) a) (+25) - (-11)$$

$$25 : \begin{array}{r} 128 \ 64 \ 32 \ 16 \ 8 \ 4 \ 2 \ 1 \\ 0 \ 0 \ 0 \ 1 \ 1 \ 0 \ 0 \ 1 \end{array}$$

$$\begin{array}{r} 115 \\ 28 \\ 16- \\ \hline 9 \end{array}$$

$$11 : \begin{array}{r} 128 \ 64 \ 32 \ 16 \ 8 \ 4 \ 2 \ 1 \\ 0 \ 0 \ 0 \ 0 \ 1 \ 0 \ 1 \ 1+ \end{array}$$

$$\begin{array}{r} 11 \\ 8- \\ \hline 3 \end{array}$$

$$-11 : \begin{array}{r} 1 \ 1 \ 1 \ 1 \ 0 \ 1 \ 0 \ 1 \\ 1 \ 1 \ 0 \ 0 \ 1 \ 1 \ 1+ \end{array}$$

$$\begin{array}{r} 11 \ 11 \\ 11- \\ \hline 0 \end{array}$$

$$(25) - (-11) : \begin{array}{r} 0 \ 0 \ 0 \ 1 \ 1 \ 0 \ 0 \ 1 \\ 0 \ 0 \ 0 \ 0 \ 1 \ 0 \ 1 \ 1+ \\ \hline 0 \ 0 \ 1 \ 0 \ 0 \ 1 \ 0 \ 0 \end{array}$$

$$\begin{array}{r} 128 \ 64 \ 32 \ 16 \ 8 \ 4 \ 2 \ 1 \\ 0 \ 0 \ 1 \ 0 \ 0 \ 1 \ 0 \ 0 \end{array} \rightarrow \text{NO OVERFLOW}$$

$$b) (-62) - (+49)$$

$$62 : \begin{array}{r} 128 \ 64 \ 32 \ 16 \ 8 \ 4 \ 2 \ 1 \\ 0 \ 0 \ 1 \ 1 \ 1 \ 1 \ 0 \end{array}$$

$$\begin{array}{r} 62 \\ 32- \\ 28- \\ \hline 16- \\ 14- \\ 8- \\ 4- \\ 2- \\ 1 \end{array}$$

$$-62 : \begin{array}{r} 1 \ 1 \ 0 \ 0 \ 1 \ 1 \ 1+ \end{array}$$

$$49 : \begin{array}{r} 128 \ 64 \ 32 \ 16 \ 8 \ 4 \ 2 \ 1 \\ 0 \ 0 \ 1 \ 1 \ 0 \ 0 \ 1 \end{array}$$

$$\begin{array}{r} 49 \\ 32- \\ 17- \\ 16- \\ 14- \\ 8- \\ 4- \\ 2- \\ 1 \end{array}$$

$$-(49) : \begin{array}{r} 1 \ 1 \ 0 \ 0 \ 1 \ 1 \ 1+ \end{array}$$

$$\begin{array}{r} 1 \\ 1 \end{array}$$

$$(-62) - (+49) : \begin{array}{r} 1 \ 1 \ 0 \ 0 \ 0 \ 0 \ 1 \ 1 \\ 1 \ 1 \ 0 \ 0 \ 1 \ 1 \ 1+ \\ \hline 1 \ 1 \ 0 \ 0 \ 1 \ 1 \ 1 \end{array}$$

$$\cancel{\begin{array}{r} 1 \ 1 \ 0 \ 0 \ 1 \ 1 \ 1+ \\ \hline 1 \ 1 \ 0 \ 0 \ 1 \ 1 \ 1 \end{array}}$$

$$\cancel{\begin{array}{r} 1 \ 1 \ 0 \ 0 \ 1 \ 1 \ 1+ \\ \hline 1 \ 1 \ 0 \ 0 \ 1 \ 1 \ 1 \end{array}} \rightarrow \text{OVERFLOW OCCURS}$$