

Q1

$$x * 23$$

$$\hookrightarrow 16 + 4 + 2 + 1$$

$$2^4 + 2^2 + 2^1 + 2^0$$

$$2^4 + 2^2 + 2^1 + 1$$

$$x \ll 4 + x \ll 2 + x \ll 1 + x$$

Q2

Two's Complement -13

$$1 \Rightarrow B = 00001101$$

$$\text{Invert} = 11110010$$

$$\begin{array}{r} \text{Add } 1 = \\ 11110010 \\ + 1 \\ \hline 11110011 \end{array}$$

$$\begin{array}{r|l} 2 & 13 \\ 2 & 6-1 \\ 2 & 3-0 \\ & 1-1 \end{array}$$

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