

Comp Arch HW 3: Computer Arithmetic

1. $11_{10} + C6_{16}$

$$\begin{array}{r} \downarrow \downarrow \\ \begin{array}{c} C \quad 6 \\ 1100 \quad 0110 \end{array} \\ \hline 91/2 = 45R1 \\ 45/2 = 22R1 \\ 22/2 = 11R0 \\ 11/2 = 5R1 \\ 5/2 = 2R1 \\ 2/2 = 1R0 \\ 1/2 = 0R1 \end{array}$$

$b1011011 + b11000110$

$$\begin{array}{r} 1111 \\ b01011011 \\ + b11000110 \\ \hline \end{array}$$

$b100100001$

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$$\begin{array}{r} 1111 \\ 20020002 \end{array}$$

$2^8 + 2^5 + 2^0 = 289_{10}$ Integer

2. $11_8 - 11_{10}$

$$\begin{array}{r} 8^1 \quad 8^0 \quad \downarrow \downarrow \\ \begin{array}{c} 11/2 = 5R1 \\ 5/2 = 2R1 \\ 2/2 = 1R0 \\ 1/2 = 0R1 \end{array} \end{array}$$

$b1011$

$$\begin{array}{r} b1001 \\ - b1011 \\ \hline \end{array} \Rightarrow \begin{array}{r} b1001 \\ + b0101 \\ \hline \end{array}$$

$b1101$ 2's

-2_{10} signed integer

3. $12.3125_{10} + 0110_{I2Q2}$

$$\begin{array}{r} \downarrow \\ \begin{array}{ll} 12/2 = 6R0 & .3125 \times 2 = 0.6250 \quad 0 \\ 6/2 = 3R0 & .6250 \times 2 = 1.25 \quad 1 \\ 3/2 = 1R1 & .25 \times 2 = 0.5 \quad 0 \\ 1/2 = 0R1 & .5 \times 2 = 1.0 \quad 1 \end{array} \end{array}$$

$0011 \quad 0101$

$$\begin{array}{r} 1100 \quad 0101 \quad I2Q4 \\ + 0001 \quad 1000 \quad I2Q4 \\ \hline \end{array}$$

$1101 \quad 1101 \quad I4Q4$

$2^3 + 2^2 + 2^0 + 2^{-1} + 2^{-2} + 2^{-3} = 13.8125_{10}$ fixed pt.