

HW 3

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10/2/17

$$1. \quad 91_{10} + C6_{16} \rightarrow \begin{array}{cc} 12 & 6 \\ 16^1 & 16^0 \end{array} = 12 \times 16 + 6 = 198$$

$$\begin{array}{ccccccc} 1 & 0 & 1 & 1 & 0 & 1 & 1 \\ 2^6 & 2^5 & 2^4 & 2^3 & 2^2 & 2^1 & 2^0 \\ 64 & 32 & 16 & 8 & 4 & 2 & 1 \end{array}$$

$$\begin{array}{ccccccc} 1 & 1 & 0 & 0 & 0 & 1 & 1 & 0 \\ 2^7 & 2^6 & 2^5 & 2^4 & 2^3 & 2^2 & 2^1 & 2^0 \\ 128 & 64 & & & & & & \end{array}$$

$$\begin{array}{r} \begin{array}{cccccccc} & 1 & 1 & 0 & 0 & 0 & 1 & 1 & 0 \\ & 1 & 0 & 1 & 1 & 0 & 1 & 1 & 2 \end{array} \\ \hline 1 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 1 & 2 \end{array}$$

$$= 258 + 32 + 1 = \boxed{291_{10}}$$

$$2. \quad 11_8 - 11_{10} \rightarrow \begin{array}{c} 8^1 + 1 = 9_{10} \\ \downarrow \\ 1011_2 \end{array}$$

$$\begin{array}{r} 01001_{10} \\ - 1011 \\ \hline 1 \end{array}$$

$$\begin{array}{r} \begin{array}{cccc} 1 & 0 & 0 & 1_2 \\ 0 & 1 & 0 & 0_2 \\ + & 0 & 0 & 0 & 1_2 \end{array} \\ \hline 1 & 1 & 1 & 0_2 = -2_{10} \end{array}$$

$$\begin{array}{cccc} 1 & 0 & 0 & 1_2 \\ 2^3 & 2^2 & 2^1 & 2^0 \end{array}$$

$$11_8 - 11_{10} =$$

$$\boxed{-2_{10}}$$

$$3. 12.3125_{10} + 0110_{12QZ} \rightarrow 01.10_2$$

$$\begin{array}{ccccccc} 1 & 0 & 0 & 0 & 1 & 1 \\ 2^3 & 2^2 & 2^1 & 2^0 & 2^{-1} & 2^{-2} & 2^{-3} \end{array}$$

$$\begin{array}{r} 1100.011 \\ + 01.10 \\ \hline 1101.111_2 \end{array}$$

$$8 + 4 + 1 + \frac{1}{2} + \frac{1}{4} + \frac{1}{8}$$

$$= 13.825_{10}$$

$$4. 5.75_{10} - 7.125_{10}$$

$$\begin{array}{r} 0101.110 \\ + 1900.111 \\ \hline 1110.101 \end{array}$$

$$\begin{array}{cccc} 1 & 0 & 1 & 1 \\ 2^3 & 2^2 & 2^1 & 2^0 \end{array}$$

$$-7.125 = -8 + .875$$

$$= -2_{10} + .625_{10} = -1.375_{10}$$

$$5. 9_{10} \cdot 3_{10}$$

$$\begin{array}{cccc} 1 & 0 & 0 & 1 \\ 2^3 & 2^2 & 2^1 & 2^0 \end{array}$$

$$\begin{array}{r} 1001_2 \\ \times 11_2 \\ \hline 1001_2 \\ 10010_2 \\ \hline 11011_2 \end{array}$$

$$8 + 16 + 2 + 1 = 27_{10} \checkmark$$

$$6. (-5) \cdot (-6)_{10}$$

$$\downarrow 2s \text{ Complement}$$

$$\begin{array}{r} 1010 \\ \times 1011 \\ \hline 10100000 \\ 11111100 \\ 00000000 \\ 111011000 \\ \hline 10101111110 \end{array}$$

used 5 bits because 30 has 5 bits

$$= 30_{10} \checkmark$$

$$8. -1.25_{10} \rightarrow -2 + 0.75 = 1110.11$$

$$\times 3.5_{10} = 0011.1$$

$$\begin{array}{r} 1110.11 \\ \times 0011.10 \\ \hline 111110110 \\ 111101100 \\ 111011000 \\ \hline 101110111010 \end{array}$$

$$-4.375_{10}$$

$$= 1011.1010 = -5_{10} + 0.725_{10} = -4.375_{10}$$