

HW 3

$$1. 9_{10} - 64 = 27 - 16 = 11 - 8 = 3 - 2 = 1$$

$$9_{10} = 1011011$$

$$C6_{16} = 11000110$$

$$\begin{array}{r} 12 \times 6 \\ 1100 \\ \downarrow \\ 6 \\ 0110 \end{array} = 256 + 32 + 1 = 289_{10}$$

$$2. 11_8 \rightarrow 001001_2 \rightarrow 01001 \quad (signed) \quad \begin{array}{r} 01001 \\ + 0101 \\ \hline 11110 \\ \hline \end{array} = -2$$

$14 - 16 = -2$

$$3. 12.3125_{10} \rightarrow 1100.0011_2 \rightarrow 011000011_{15Q4}$$

$$0110_{12Q2} \rightarrow 000011000_{15Q4}$$

$$\begin{array}{r} 011000011 \\ + 000011000 \\ \hline 011011011 \end{array} = 13.6875_{10}$$

$\frac{1}{2} + \frac{1}{8} + \frac{1}{16} \dots$

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

$$5.75_{10} \rightarrow 0101.11_2 \rightarrow 0101110_{14Q3}$$

$$-7.125_{10} \rightarrow 1001.001 \rightarrow 1001001_{14Q3} \quad (signed)$$

$$\begin{array}{r} 0101110 \\ \nearrow 1001001 \\ \hline 1110111_{14Q3} \\ \hline \end{array} = 110.111_2 \quad (signed)$$

$$= -2.875$$

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

$$= 1001_2 \cdot 0011_2$$

$$\begin{array}{r} 1001 \\ \times 0011 \\ \hline 1001 \\ 1001 \\ \hline 11011 \end{array}$$

$$16 + 8 + 2 = 27_{10}$$

6. $-5_{10} = 1111011_2$ (signed)
 $-6_{10} = 1111010_2$ (signed)

$$\begin{array}{r}
 1111011 \\
 \times 1111010 \\
 \hline
 0000000 \\
 1111011 \\
 0000000 \\
 1111011 \\
 1111011 \\
 1111011 \\
 1111011 \\
 1111011 \\
 \hline
 0011110
 \end{array}$$

$16 + 8 + 4 + 2 = 30_{10}$

7. $9.5_{10} = 01001.1000 = 010011000_{2584}$
 $2.625_{10} = 00010.1010 = 000101010_{4584}$

$$\begin{array}{r}
 010011000 \\
 \times 000101010 \\
 \hline
 00000000 \\
 00000000 \\
 00000000 \\
 00000000 \\
 00000000 \\
 00000000 \\
 00000000 \\
 00000000 \\
 00000000 \\
 \hline
 0110001111000
 \end{array}$$

211000111_{4584}
 $16 + 8 + \frac{1}{2} + \frac{1}{4} + \frac{1}{8} + \frac{1}{16}$

$= 24.9375$

8. $-1.25 \rightarrow -0001.01_2 \rightarrow 1110.01 + 1_2 \rightarrow 1111010_{1483}$
 $3.5 \rightarrow 0011.10_2 \rightarrow 001110_{1483}$

$$\begin{array}{r}
 1111010 \\
 0011100 \\
 \hline
 00000000 \\
 00000000 \\
 00000000 \\
 00000000 \\
 00000000 \\
 00000000 \\
 00000000 \\
 00000000 \\
 \hline
 1011011000
 \end{array}$$

$\rightarrow 1011.011$ (signed)
 $\rightarrow -0100.011$
 $= -4.375$