Comparch HW 060011

1)

$$\begin{array}{r} \cancel{9}^{8}\cancel{1}_{10} \\ -64_{10} \\ \hline 27_{10} \\ -16 \\ \hline 11 \\ 8 \\ \hline 3 \\ 2 \\ \hline 1 \end{array}$$

$91_{10} = 64 + 16 + 8 + 2 + 1 =$

1011011_{49QO}

$C_{16} = 12_{10} = 8_{10} + 4_{10} = 1100_2$

$6_{16} = 4_{10} + 2_{10} = 0110_2$

$C6_{16} = 11000110_{49QO}$

$$\begin{array}{r} 1\ \ 1\ 1\ 1\ 1 \\ 0\ 1\ 0\ 1\ 1\ 0\ 1\ 1_{49QO} \\ +\ 1\ 1\ 0\ 0\ 0\ 1\ 1\ 0_{49QO} \\ \hline 1\ 0\ 0\ 1\ 0\ 0\ 0\ 0\ 1_{49QO} \end{array}$$

$\boxed{100100001_{49QO}} = 1_{10} + 32_{10} = 256_{10} = \boxed{289_{10}}$

2)

$11_8 = 01001_{15QO}$

$11_{10} = 8_{10} + 2_{10} + 1_{10} = 01011_{15QO}$

$-11_{10} = 10101_{15QO}$

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

$\boxed{11110_{15QO}} = -00010_{15QO} = \boxed{-2_{10}}$

3) $12.3125 = 8 + 4 + \frac{1}{4} + \frac{1}{16} =$

1100.0101_{UQ4} $\quad 0110_{12Q2} = 110_{1Q2} =$

0001.1000_{UQ4}

$$\begin{array}{r} 1100.0101 \\ + \; 0001.1000 \\ \hline 1101.1101 \end{array}$$

$1101.1101_{UQ4} =$

$13.8125_{10} =$

$8_{10} + 4_{10} + 1_{10} + \frac{1}{2_{10}} + \frac{1}{4_{10}} + \frac{1}{16_{10}}$

4) $5.75_{10} = 0101.11_{1Q2}$ $\quad 7.125_{10} = 0111.001_{1Q3}$

$-7.125_{10} = 1000.111_{1Q3}$

$$\begin{array}{r} 0101.110 \\ + \; 1000.111 \\ \hline 1110.101 \end{array} \; {}_{1Q3}$$

$1110.101_{1Q3} = -0001.011_{1Q3} = -1_{10} - \frac{1}{4_{10}} - \frac{1}{8_{10}}$

-1.375_{10}

5) $9_{10} = 1001_{USQO}$ $\quad 3_{10} = 11_{USQO}$

$$\begin{array}{r} 1001 \\ \times \quad 11 \\ \hline 01001_{USQO} \\ +\ 10010_{USQO} \\ \hline 11011_{USQO} \end{array}$$

$11011_{USQO} = 16_{10} + 8_{10} + 2_{10} + 1_{10} = \boxed{27_{10}}$

6) $5_{10} = 0101_{I4QO}$ $\quad 6_{10} = 0110_{I4QO}$

$-5_{10} = 1011_{I4QO}$ $\quad -6_{10} = 1010_{I4QO}$

$-5_{10} = 11111011_{I8QO}$ $\quad -6_{10} = 11111010_{I8QO}$

$$\begin{array}{r} 11111011 \\ \times\ 11111010 \\ \hline \text{(not real)} \\ 00000000 \\ 11111011 \\ 00000000 \\ 11111011 \\ 11111011 \\ 11111011 \\ +\ 11111011 \\ \hline 00011110 \end{array} \quad \} I_{8QO}$$

$00011110_{I8QO} = 2_{10} + 4_{10} + 8_{10} + 16_{10} = \boxed{30_{10}}$

7) $9.5_{10} = 1001.1_{V4Q1}$ $\quad 2.625_{10} = 10.101_{V2Q3}$

not real

$$\begin{array}{r} 1001.1_{V4Q1} \\ \times\ 10.101_{V2Q3} \end{array}$$

$$\begin{array}{r} 1111 \\ 00000\,1.0011 \\ 0000\,0.0000 \\ 0001\,00.1100 \\ +\ 0100\,1.1000 \\ \hline 0110\,00.1111 \end{array} \quad V_{6Q4}$$

$$1100\,0.1111_{V5Q4} = 24.9375_{10} =$$

$$16_{10} + 8_{10} + \frac{1}{2_{10}} + \frac{1}{4_{10}} + \frac{1}{8_{10}} + \frac{1}{16_{10}}$$

8)

$1.25_{10} = 01.01_{I2Q2}$ $\quad 3.5_{10} = 011.1_{I_3Q_1}$

$-1.25_{10} = 10.11_{I_2Q_2}$

$$\begin{array}{r} 110\,1_{I_5Q_2} \\ \times\ 011\,10_{I_3Q_2} \\ \hline 1111 \\ 1111\,1.0110 \\ 1111\,0.1100 \\ +\ 1111\,01.1000 \\ \hline 1110\,11.1010 \end{array} \quad I_{6Q4}$$

$$11101\,1.1010_{I6Q4} =$$

$$-00010\,0.0110_{I6Q4} =$$

$$\boxed{-4.375_{10}}$$

1) Sign bit is 1

$5.6875_{10} = 1.01.1011$

fraction is 11.011011

exponent is 2_{10}

$2 + 127_{10}$ is $129_{10} = 10000001$

1 | 10000001 | 01101100000000000000000

2)

0 | 1000 1001 | 1111 1000 0100 0000 0000 0001

sign bit is 0

exponent +127 $128 + 8 + 1 = 137_{10}$

exponent is 10_{10}

$1.1111000001_2 = 1 + 32 + 64 + 128 + 256 + 512 + 1024 =$

2017_{10}