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CompArch HW #3

Oct. 1, 2016

1. $91_{10} + C6_{16} = 289$

$2\overline{)91} = 45$ R1

$2\overline{)45} = 22$ R1

1011011 ← 91_{10} to binary

$2\overline{)22} = 11$ R0

$2\overline{)11} = 5$ R1

$2\overline{)5} = 2$ R1

$2\overline{)2} = 1$ R0.

$2\overline{)1} = 0$ R1

0 1 2 3 4 5 6 7 8 9 A B C D E F

$C6 = (12 \times 16^1) + (6 \times 16^0) = 198$ ← $C6_{16}$ to decimal

$2\overline{)198} = 99$ R0

11000110 ← $C6_{16}$ to binary

$2\overline{)99} = 49$ R1

$2\overline{)49} = 24$ R1

$2\overline{)24} = 12$ R0

$2\overline{)12} = 6$ R0

$2\overline{)6} = 3$ R0

$2\overline{)3} = 1$ R1

$2\overline{)1} = 0$ R1

```
   11000110
 +  1011011
 ----------
(1)00100001
```

↳ $1 + 32 + 256 = \boxed{289}$

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

11_8 → 0 1 2 3 4 5 6 7

$(1 * 8^1) + (1 * 8^0) = 9$ ← 11_8 to decimal

1001 ← 11_8 to binary

-11_{10} to binary → 1011 → 0100 → 0101

$$\begin{array}{r} 1001 \\ +\ 0101 \\ \hline 1110 \end{array}$$

→ 0001 + 1 → signed 0010

↳ $\boxed{-2}$

3. 12.3125_{10} + 0110_{I2Q2} = 13.8125

↳ 1.5 in decimal

0.3125 × 2 = 0.625 ⟶ 1100.0101 ← 12.3125_{10} in binary.

0.625 × 2 = 1.25

0.25 × 2 = 0.50

.50 × 2 = 1.00.

$$\begin{array}{r} 1100.0101 \\ +\ 0110.0000 \\ \hline (1)0010.0101 \end{array}$$

01101.1101 = $\boxed{13.8125}$

4. $5.75_{10} + (-7.125_{10})$ → I2Q3

111.001 → 000.111 = -7.125_{10}

↓

101.110

$$\begin{array}{r} 101.110 \\ +\ 000.111 \\ \hline 110.101 \end{array}$$

→ 001.011 = $\boxed{-1.375}$

1.375

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

1001 0011

```
    1001
  × 0011
  ------
    1001
   1001
  0000
 0000
--------
00011011   = 27₁₀
```

$= \boxed{27_{10}}$

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

0101 → 1010 + 1 ⇒ 1011 → −5 in binary
0110 → 1001 + 1 ⇒ 1010 → −6 in binary.

```
      0101
      0110
      ----
      0000
     0101
    0101
   0000
   -------
   0011110
```

→ since signs were same at the start, thus number is positive.

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

7. $9.5_{10} \cdot 2.625_{10}$

1001.100 0010.101

```
          1001.100
        × 0010.101
        ----------
          1.001100
        10.00000
       100.1100
      0000.000
     10011.00
    000000.0
   0000000.
  ----------------
  00111000.111100
```

$= \boxed{24.9375_{10}}$

8. $-1.25_{10} \cdot 3.5_{10} = -4.375$

01.01 → 10.10 + 1 → 10.11 → -1.25_{10} in binary.

11.10 → 3.5_{10} in binary.

```
      01.01
      11.10
     ------
     .0000
    0.101
   01.01
  010.1
 -----------
signed 100.0110
```

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