COMP ARCH HW03

34.50/36.00
-1 for 1c
-0.5 for 8b

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Scoring:
2 points for converting to binary

1 point if addition arithmetic

2 points for multiplication (problems 5-8)

1 point for converting correctly

1 $91_{10} + C6_{16}$

(a) $91_{10} = 1011011_2$ (unsigned) ~~U7Q0~~

01011011 (U8Q0 <- wrote this in part B)

$C6_{16} = 126_{16} = 11000110_2$ (unsigned) U8Q0

(b)
```
  1 1 1 1
+ 0 1 0 1 1 0 1 1
  1 1 0 0 0 1 1 0
1 0 0 1 0 0 0 0 1
```
(unsigned) U8Q0

(c) ~~417~~ $_{10}$

289 base 10 (simple addition mistake)

2 $11_8 - 11_{10}$

(a) $11_8 = 1001_2 = 9_{10} = 01001_2$ U4Q0 I5Q0

$11_{10} = 1011_2 \rightarrow -11 = 10101_2$ (signed) I5Q0

(b)
```
  1
+ 0 1 0 0 1
  1 0 1 0 1
  1 1 1 1 0
```
15Q0 ⇒ (c) -2_{10}

— FLIP —
0 0 0 0 1 + 1 = -2

Took a different path by treating 11 base 10 as -11 base 10

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

(a) $12.3125_{10} = b01100.0101_{I5Q4}$

$0110_{I2Q2} =$ ~~b01100~~ $b01.10_{I2Q2} = b00001.1000_{I5Q4}$

(b)
```
  0 1 1 0 0.0 1 0 1
+ 0 0 0 0 1.1 0 0 0
  0 1 1 0 1.1 1 0 1
```
I5Q4 ⇒ (c) 13.8125_{10}

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

I4Q3

ⓐ $5.75_{10} = 0101.110_2$ ~~I0~~

$-7.125_{10} = -(7.125_{10}) = -(0111.001)_2 \Rightarrow 1000.110 + 1$

$\Downarrow$

1000.111 I4Q3

ⓑ $0101.110 + 1000.111$

1110.101_2

$\Downarrow$ I4Q3

negative $\Downarrow$

0001.011_2

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

$\boxed{-1.375_{10}}$

5| $9_{10} \cdot 3_{10}$ ← That's a 3

ⓐ $9_{10} \Rightarrow 1001_2$ (unsigned) U4Q0

$3_{10} \Rightarrow 0011_2$ (unsigned) U4Q0

ⓑ $1001_2 * 0011_2$ U5Q0 U5Q0

1001

10010

$0\,11011_2$ U5Q0

$16\ 8\ 4\ 2\ 1$

ⓒ 11011_2

$\Downarrow$

$\boxed{27_{10}}$

6| $(-5)_{10} \cdot (-6)_{16}$

I4Q0

ⓐ $(-5)_{10} = 1011_2$ (signed)

$(-6)_{16} = 1010_2$ (signed)

I4Q0

ⓑ 11111011 I8Q0 $* 11111010$ I8Q0

00000000

11111011

11110110

11101100

11011000

10110000

01100000

00011110_2 I8Q0

$16\ 8\ 4\ 2\ 1$

ⓒ 00011110_2

$\Downarrow$

$\boxed{30_{10}}$

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

ⓐ $9.5_{10} \Rightarrow 1001.100_{U4Q3}$

$2.625_{10} \Rightarrow 0010.101_{U4Q3}$ ~~EXPECT~~

ⓑ
```
      *01001.1000  USQ4
       00010.1010
      ------------
       1 1 0 0 1 1 0 0 USQ4
      1 0 0 1 1 0 0
   1 0 0 1 1 0 0
   -----------------
000110001.11100₂
```

11000.111100_2 USQ4

ⓒ $\boxed{24.9375_{10}}$

8] $(-1.25)_{10} \cdot 3.5_{10}$

ⓐ $(-1.25)_{10} = -(1.25_{10}) = -(01.01_2) = 10.10 + 1 = 10.11_2$ I2Q2 $\Rightarrow 110.11_2$ ~~I2Q~~ I3Q2

$3.5_{10} = 011.1_2 = 011.10_2$ I3Q2

~~EXPECT I6Q4~~

ⓑ
```
        111110.110   I6Q3
      * 000011.100   I6Q3
      ------------
        1111101100
       11111011XXX
      11111011XXXX
      ---------------
      0100011.101
```
$= 100011.101$ I6Q3

FLIP +1

$\Downarrow$

$100.010 + 1$

$\Downarrow$

$100.0110_2 = -4.375_{10}$

ⓒ $\boxed{-4.375_{10}}$

This worked but is somewhat questionable