Kai Levy

Comp Arch HW 3

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

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

$= 1011011$

$C6_{16}$: C = 1100, 6 = 0110

$= 11000110$

$0\ 1011011$
$+\ 11000110$

} unsigned, 8-bit integers

100100001_2 ← unsigned, 9-bit integer

$= \boxed{289_{10}}$

(2) $11_5 - 11_{10}$

1001 | 1011 } Unsigned, 4-bit integers

~ Twos complement ~

01001 | 10101 } Signed, 5-bit integers

01001
$+\ 10101$

11110 } Signed, 5-bit integer

$= -00010$

$= \boxed{-2}$

Signed, 4-bit, fixed-point

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

0110.0101_{I4Q4} (Signed, 8-bit, fixed-point) 0001.1000_{I4Q4}

$$\begin{array}{r} 0110\ 0101 \\ +\ 0001\ 1000 \\ \hline 0111\ 1101_{I4Q4} \end{array}$$

$= \boxed{13.8125_{10}}$

(4) $5.75_{10} - 7.125_{10}$

0101.110_{I4Q3} 0111.001_{I4Q3} } Signed, 7-bit, fixed point

~ two's complement ~

$$\begin{array}{r} 1000.111_{I4Q3} \\ 0101\ 110 \\ +\ 1000\ 111 \\ \hline 1111\ 101_{I4Q3} \end{array}$$ } Signed, 7-bit, fixed-point

$- 0001\ 011$

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

(5) $9_{10} \cdot 3_{10}$

1001 0011 } Unsigned, 4-bit, Integers

```
  1001
x 0011
------
  1001
 1001
------
 10110
00000
------
 10110
```

] Unsigned, 5-bit, Integer

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

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

-0101 -0110

↓ twos complement

1011 1010] Signed, 8-bit, Integers

```
  1011
  1010
------
  0000
 1011
------
 1110
```

```
  1011
  1010
------
  0000
 1011
------
 1110
```

```
  1011
  1010
------
  0000
 1011
------
 1110
```

```
  1011
  1010
------
  0000
 1011
------
 1110
```

```
  1011
  1010
------
  0000
 1011
------
 1110
```

```
  1011
  1010
------
  0000
 1011
------
 1110
```

```
  1011
  1010
------
  0000
 1011
------
 1110
```

```
  1011
  1010
------
  0000
 1011
------
 1110
```

Don't cause 00011110] Signed, 8-bit, Integer

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

⑦ $9.5_{10} \cdot 2.625_{10}$

1001.100_{U4Q3} 0010.101_{U4Q3}] Unsigned, 7-bit, Fixed-point

```
      1001100
    × 0010101
      1001100
     00000000
    100110000
  00000000000
 1001110000000
```

1.35
1.35

$11000.11110\!\!\!\!\!00_{U5Q4}$] Unsigned, 9-bit, Fixed-poin
$= 24.9375_{10}$

⑧ $-1.25_{10} \cdot 3.5_{10}$

Radmer helped

1 0111 01000   0 1000 11000] Signed, 10-bit, floating point

XOR Signs: 1

ADD EXPONENTS:
```
 0111
 1000
 1111
```

MULTIPLY SIGNIFICANDS:
```
   1.11000
   1.01000
   111000000
 11100000000
   1.00110
```

= 1 1111 00110

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

0001 0100 → 0011.1000 $_{I4Q4}$

1110 1100

1110.1100 $_{I4Q4}$ Signed, 8-bit, fixed point

1110.1100

0011.1000

0

00

000

1111.0110 0000

1110.1100 0000

1101.1000 0000

(1)1011.1010 $_{I4Q4}$ Signed, 8-bit, fixed point

0100.0110

$= -4.375_{10}$