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Computer Organization: Assignment 3

Edition 3:

3.1) $4096_{10} \to$ 32-Bit Binary

$$
\begin{array}{l}
2 \,)\, 4096 \\
2 \,)\, 2048 \text{ R0} \\
2 \,)\, 1024 \text{ R0} \\
2 \,)\, 512 \text{ R0} \\
2 \,)\, 256 \text{ R0} \\
2 \,)\, 128 \text{ R0} \\
2 \,)\, 64 \text{ R0} \\
2 \,)\, 32 \text{ R0} \\
2 \,)\, 16 \text{ R0} \\
2 \,)\, 8 \text{ R0} \\
2 \,)\, 4 \text{ R0} \\
2 \,)\, 2 \text{ R0} \\
2 \,)\, 1 \text{ R0} \\
\quad 0 \text{ R1}
\end{array}
$$

$\therefore 4096_{10} = 1\ 0000\ 0000\ 0000_2$

32-bit $= 0000\ 0000\ 0000\ 0000\ 0001\ 0000\ 000\ 0000_2$

3.2) $-2047_2 \to$ 32 bit binary

$$
\begin{array}{l}
2 \,)\, 2047 \\
2 \,)\, 1023 \text{ R1} \\
2 \,)\, 511 \text{ R1} \\
2 \,)\, 255 \text{ R1} \\
2 \,)\, 127 \text{ R1} \\
2 \,)\, 63 \text{ R1} \\
2 \,)\, 31 \text{ R1} \\
2 \,)\, 15 \text{ R1} \\
2 \,)\, 7 \text{ R1} \\
2 \,)\, 3 \text{ R1} \\
2 \,)\, 1 \text{ R1} \\
\quad 0 \text{ R1}
\end{array}
$$

$2047_{10} = 111\ 1111\ 1111_2$

$-2047_{10} = 000\ 0000\ 000\ 1_2$

32-bit $= 1111\ 1111\ 1111\ 1111\ 1111\ 1000\ 0000\ 000\ 1_2$

3.4) 1111 1111 1111 1111 1111 1111 0000 0110_2

0000 0000 0000 0000 0000 0000 1111 1010_2

$2 + 2^3 + 2^4 + 2^5 + 2^6 + 2^7 = 250_{10}$

$\therefore -250_{10}$

3.5) 1111 1111 1111 1111 1111 1111 1110 1111_2

0000 0000 0000 0000 0000 0000 0001 0001_2

$1 + 2^4 = 17_{10}$

$\therefore -17_{10}$

3.6) 0111 1111 1111 1111 1111 1111 1110 1111

$2^0 + 2^1 + 2^2 + 2^3 + 2^5 + 2^6 + 2^7 + 2^8 + 2^9 + 2^{10} + 2^{11}$
$+ 2^{12} + 2^{13} + 2^{14} + 2^{15} + 2^{16} + 2^{17} + 2^{18} + 2^{19} + 2^{20} + 2^{21}$
$+ 2^{22} + 2^{23} + 2^{24} + 2^{25} + 2^{26} + 2^{27} + 2^{28} + 2^{29} + 2^{30}$

$\therefore = 2147483631_{10}$

3.7) abs $t2, $t3

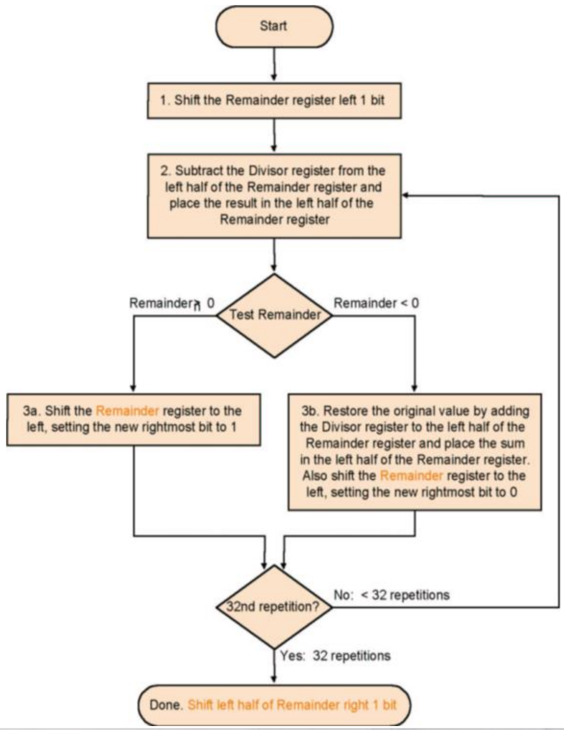
```
addu $t2, $t3, $zero   # add contents of t3 into t2
bge  $t3, $zero, goto  # check if t3 ≥ 0
sub  $t2, $zero, $t3   # if t3≥0, then 0-(-t3) = t3
```

3.9) If A_lower is sign-extended, then A_upper_adjusted is adjusted as A_upper + 1.

3.10) overflow for addition occurs when we add 2 positive numbers and get a negative result

```
addu $t2, $t3, $t4
sltu $t2, $t2, $t3   # t2 = 1 if t2 < t3 (overflow)
```

3.29) For this question, we can use the algorithm presented in the PowerPoint of chapter 3. We will refer to the third version of division algorithm.



Iteration	Step	DIV	Remainder
i=0	Init	0011	0000 1011
	sll R		0001 0110
1	Rem -= DIV	0011	1110 0110
	Rem<0 → +DIV sll R, R_0 = 0	0011	0010 1100
2	Rem -= DIV	0011	1111 1100
	Rem<0 → +DIV, sll R, R_0 = 0	0011	0101 1000
3	Rem -= DIV	0011	0010 1000
	Rem>0 → sll R, R_0 = 1	0011	0101 0001
4	Rem -= DIV	0011	0010 0001
	Rem>0 → sll R, R_0 = 1	0011	0100 0011
Fin	shift left half right		0010 0011

Quotient = 0011, Remainder = 0010

3.35) $2.85 \times 10^3 + 9.84 \times 10^4$

Alignment — 0.285×10^4, 9.84×10^4

$$\begin{array}{r} 0.285 \times 10^4 \\ + \quad 9.840 \times 10^4 \\ \hline 10.125 \times 10^4 \end{array} \rightarrow 1.0125 \times 10^5$$

$\therefore$ guard & round — 1.01×10^5

w/o — 1.01×10^5

Edition 4:

3.1.1)

a.

$$\begin{array}{lr} 3174_8 \rightarrow & 011\ 001\ 111\ 100_2 \\ 0522_8 \rightarrow & +\ 000\ 101\ 010\ 010_2 \\ \hline & 011\ 111\ 001\ 110 \\ & 3 \quad 7 \quad 1 \quad 6 \end{array}$$

$\therefore 3716_8$

b.

$$\begin{array}{lr} 4165_8 \rightarrow & 100\ 001\ 110\ 101 \\ 1654_8 \rightarrow & +\ 001\ 110\ 101\ 100 \\ \hline & 110\ 000\ 100\ 001 \\ & 6 \quad 0 \quad 4 \quad 1 \end{array}$$

$\therefore 6041_8$

3.1.2)

a.

$$\begin{array}{lr} 3174_8 \rightarrow & 011\ 001\ 111\ 100_2 \\ 0522_8 \rightarrow & +\ 000\ 101\ 010\ 010_2 \\ \hline & 011\ 111\ 001\ 110 \\ & 3 \quad 7 \quad 1 \quad 6 \end{array}$$

$\therefore 3716_8$

b.

$$\begin{array}{lr} 4165_8 \rightarrow & 011\ 110\ 001\ 011 \\ 1654_8 \rightarrow & +\ 001\ 110\ 101\ 100 \\ \hline & [1]01\ 100\ 110\ 111 \\ & 1 \quad 4 \quad 6 \quad 7 \end{array}$$

$\therefore 1467_8$

3.1.3)

a. $3174_8 \rightarrow 011\ 001\ 111\ 100_2$

$2^2 + 2^3 + 2^4 + 2^5 + 2^6 + 2^7 + 2^{10} = 1660_{10}$ (signed & unsigned)

b. $4165_8 \rightarrow 100\ 001\ 110\ 101_2$

unsigned: $2^0 + 2^2 + 2^4 + 2^5 + 2^6 + 2^{11} = 2165_{10}$ signed: $-1(2^0 + 2^2 + 2^4 + 2^5 + 2^6) = -117$

3.2.4)

a. $C352_{16} \to 1100\ 0011\ 0101\ 0010_2$, $36AE_{16} \to 0011\ 0110\ 1010\ 1110_2$

$$
\begin{array}{lr}
C352_{16} \to & 1100\ 0011\ 0101\ 0010_2 \\
36AE_{16} \to & +\ 1100\ 1001\ 0101\ 0010_2 \\
\hline
 & 1000\ 1100\ 1010\ 0100_2 \\
 & 8\quad C\quad A\quad 4
\end{array}
$$

$\therefore 8CA4_{16}$

b. $5ED4_{16} \to 0101\ 1110\ 1101\ 0100_2$, $07A4_{16} \to 0000\ 0111\ 1010\ 0100_2$

$$
\begin{array}{lr}
5ED4_{16} \to & 0101\ 1110\ 1101\ 0100_2 \\
07A4_{16} \to & +\ 1111\ 1000\ 0101\ 1100_2 \\
\hline
 & 0101\ 0111\ 0011\ 0000_2 \\
 & 5\quad 7\quad 3\quad 0
\end{array}
$$

$\therefore 5730_{16}$

3.2.5)

a. $C352_{16} \to -4352_{16}$ $\quad -4352_{16} - 36AE_{16} \to -A - B = -(A+B)$

$$
\begin{array}{lr}
 & 0100\ 0011\ 0101\ 0010_2 \\
+ & 0011\ 0110\ 1010\ 1110_2 \\
\hline
 & 0111\ 1010\ 0000\ 0000 \\
\to & 1111\ 1010\ 0000\ 0000 \\
 & F\quad A\quad 0\quad 0
\end{array}
$$

$\therefore FA00$

b. $5ED4_{16} \to 0101\ 1110\ 1101\ 0100_2$, $07A4_{16} \to 0000\ 0111\ 1010\ 0100_2$

$$
\begin{array}{lr}
5ED4_{16} \to & 0101\ 1110\ 1101\ 0100_2 \\
07A4_{16} \to & +\ 1111\ 1000\ 0101\ 1100_2 \\
\hline
 & 0101\ 0111\ 0011\ 0000_2 \\
 & 5\quad 7\quad 3\quad 0
\end{array}
$$

$\therefore 5730_{16}$

3.2.6)

a. $C352_{16} \to 1100\ 0011\ 0101\ 0010_2$

b. $5ED4_{16} \to 0101\ 1110\ 1101\ 0100_2$

For each digit in a hex number, 4 bits are used. We can represent a byte by using 2 hex digits, which is 8 bits.

3.3.1)

a.
$$
\begin{array}{lr}
216 \to & 1101\ 1000_2 \\
255 \to & -\ 1111\ 1111_2 \\
\hline
 & \ldots 101\ 1001
\end{array}
$$

$\therefore$ underflow, -39

b.
$$
\begin{array}{lr}
185 \to & 1011\ 1001 \\
122 \to & -\ 0111\ 1010 \\
\hline
 & 0011\ 1111
\end{array}
$$

$\therefore$ neither, 63

3.3.2)

a.
$$
\begin{array}{lr}
-216 \to & 1101\ 1000_2 \\
-255 \to & +\ 1111\ 1111_2 \\
\hline
 & 11101\ 0111
\end{array}
$$

$\therefore$ overflow, -215

b.
$$
\begin{array}{lr}
-185 \to & 1011\ 1001 \\
122 \to & +\ 0111\ 1010 \\
\hline
 & 0111\ 0011
\end{array}
$$

$\therefore$ neither, 63

3.3.3)

a.
$$\begin{array}{r} 1101\ 1000 \\ -\ 111\ 1111 \\ \hline -\ 101\ 1001 \end{array}$$

∴ None, −39

b.
$$\begin{array}{r} 1011\ 1001 \\ -\ 0111\ 1010 \\ \hline (10)\ 0011\ 1111 \end{array}$$

∴ overflow, −179

3.3.4)

a.
$$\begin{array}{rcrcr} 15_{10} & \rightarrow & 0000\ 1111_2 & \rightarrow & 15_{10} \\ 139_{10} & \rightarrow & +\ 1000\ 1011_2 & \rightarrow & -117_{10} \\ \hline & & 1001\ 1010_2 & & -102_{10} \end{array}$$

b.
$$\begin{array}{rcrcr} 151_{10} & \rightarrow & 1001\ 0111_2 & \rightarrow & -105_{10} \\ 214_{10} & \rightarrow & +\ 1101\ 0110_2 & \rightarrow & -42_{10} \\ \hline & & 101101101_2 & & -147_{10} \end{array}$$

∴ saturated arithmetic: -128_{10}

3.3.5)

a.
$$\begin{array}{rcr} 0000\ 1111_2 & \rightarrow & 15_{10} \\ +\ 0111\ 0101_2 & \rightarrow & +117_{10} \\ \hline 1000\ 0100 & & 132_{10} \end{array}$$

∴ saturated arithmetic: 128_{10}

b.
$$\begin{array}{rr} 1001\ 0111_2 & -105_{10} \\ -\ 1101\ 0110_2 & +\ 42_{10} \\ \hline 1100\ 0001 & -63_{10} \end{array}$$

3.3.6)

a.
$$\begin{array}{rr} 0000\ 1111_2 & 15_{10} \\ +\ 1000\ 1011_2 & +\ 139_{10} \\ \hline 1001\ 1010_2 & 154_{10} \end{array}$$

∴ saturated arithmetic: 128_{10}

b.
$$\begin{array}{rr} 1001\ 0111_2 & 151_{10} \\ +\ 1101\ 0110_2 & +\ 214_{10} \\ \hline 10110\ 1101_2 & 365_{10} \end{array}$$

∴ saturated arithmetic: 255_{10}

3.4.1)

3.4.1) a. $62_8 \times 12_8 \rightarrow$ 110 010 × 001 010

iteration	step	multiplier	multiplicand	product
0	init vals	001 010	000 000 110 010	000 000 000 000
1	Mplier0 = 0 sll Mcand, srl Mplier	000 101	000 001 100 100	000 000 000 000
2	Mplier0 = 1 → +prod sll Mcand, srl Mplier	000 010	000 011 001 000	000 001 100 100
3	Mplier 0 = 0 sll Mcand, srl Mplier	000 001	000 110 010 000	000 001 100 100
4	Mplier0 = 1, Mcand + P sll Mcand, srl Mplier	000 000	001 100 100 000	000 111 110 100
5	Mplier 0 = 0 sll Mcand, srl Mplier	000 000	011 001 000 000	000 111 110 100
6	Mplier 0 = 0 sll Mcand, srl Mplier	000 000	110 010 000 000	000 111 110 100

product = $000\ 111\ 110\ 100_2$ = 0764_8

b. $35_8 \times 26_8 \rightarrow$ $011\ 101_2$ × $010\ 110_2$

iteration	step	multiplier	multiplicand	product
0	init vals	010 110	000 000 011 101	000 000 000 000
1	Mplier0 = 0 sll Mcand, srl Mplier	001 011	000 000 111 010	000 000 000 000
2	Mplier0 = 1, Mcand + P sll Mcand, srl Mplier	000 101	000 001 110 100	000 000 111 010
3	Mplier0 = 1, Mcand + P sll Mcand, srl Mplier	000 010	000 011 101 000	000 010 101 110
4	Mplier 0 = 0 sll Mcand, srl Mplier	000 001	000 111 010 000	000 010 101 110
5	Mplier0 = 1 sll Mcand, srl Mplier	000 000	001 110 100 000	001 001 111 110
6	Mplier0 = 0 sll Mcand, srl Mplier	000 000	011 101 000 000	001 001 111 110

product = $001\ 001\ 111\ 110_2$ = 1176_8

3.5.1)

Hardware-

If the LSB of the multiplier is equal to 0, the product register in the hardware implementation stores the sum of the product and the multiplicand register. After the addition process, the multiplicand and multiplier are simultaneously shifted left and right respectively.

For A bits, we would have A iterations. Thus, A iterations * 3 operations * B TU = 3AB time units.

Software-

Software implementation is somewhat like the hardware implementation, but instead it performs the multiplicand and multiplier shifts separately.

Again, A bits will equal to A iterations. Thus, A iterations * 5 operations * B TU = 5AB time units.

a. 3(8)(4tu) = 96 time units
   5(8)(4tu) = 160 time units
b. 3(64)(8tu) = 1536 time units
   5(64)(8tu) = 2560 time units

3.5.2)

Each bit in the adder is checked before the multiplication to let the hardware know whether to add the multiplicand or not. There are A bits, thus A iterations.

The total time taken would be A iterations * B TU = AB time units.

a. (7)(4tu) = 28 time units
b. (64)(8tu) = 504 time units

3.7.4)

3.7.4)

a. $72_8 = 07_8 \to 1[11\ 010_2] \div 0[00\ 111]_2 \to -26_{10} \div 7_{10}$

Iteration	Step	Quotient	DIV	Rem
0	Init vals	000 000	000 111 000 000	000 000 011 010
1	Rem -= DIV	000 000	000 111 000 000	111 001 011 010
	Rem<0 → +DIV	000 000	000 111 000 000	000 000 011 010
	sll Q, Q_0=0			
	srl DIV	000 000	000 011 100 000	000 000 011 010
2	Rem -= DIV	000 000	000 011 100 000	111 100 111 010
	Rem<0 → +DIV	000 000	000 011 100 000	000 000 011 010
	sll Q, Q_0=0			
	srl DIV	000 000	000 001 110 000	000 000 011 010
3	Rem -= DIV	000 000	000 001 110 000	111 110 101 010
	Rem<0 → +DIV	000 000	000 001 110 000	000 000 011 010
	sll Q, Q_0=0			
	srl DIV	000 000	000 000 111 000	000 000 011 010
4	Rem -= DIV	000 000	000 000 111 000	111 111 100 010
	Rem<0 → +DIV	000 000	000 000 111 000	000 000 011 010
	sll Q, Q_0=0			
	srl DIV	000 000	000 000 011 100	000 000 011 010
5	Rem -= DIV	000 000	000 000 011 100	111 111 111 010
	Rem<0 → +DIV	000 000	000 000 011 100	000 000 011 010
	sll Q, Q_0=0			
	srl DIV	000 000	000 000 001 110	000 000 011 010
6	Rem -= DIV	000 000	000 000 001 110	000 000 001 100
	Rem≥0	000 001	000 000 001 110	000 000 001 100
	sll Q, Q_0=1			
	srl DIV	000 001	000 000 000 111	000 000 001 100
7	Rem -= DIV	000 001	000 000 000 111	000 000 000 101
	Rem≥0	000 011	000 000 000 111	000 000 000 101
	sll Q, Q_0=0			
	srl DIV	000 011	000 000 000 011	000 000 000 101

∴ Quotient = $100\ 011_2 \to -3_{10}$

Remainder = $100\ 000\ 000\ 101_2 \to -5_{10}$

Quotient: 100 011 = -3 base10, Remainder: 100 000 000 101 = -5 base10

3.14)

a. $72_8 = C7_8 \to 1[11\ 010_2] \div 0[00\ 111]_2 \to -26_{10} \div 7_{10}$

Iteration	Step	Quotient	DIV	Rem
0	Init vals	000 000	000 111 000 000	000 000 011 010
1	Rem -= DIV	000 000	000 111 000 000	111 001 011 010
	Rem<0 → +DIV	000 000	000 111 000 000	000 000 011 010
	sll Q, Q_0 = 0			
	srl DIV	000 000	000 011 100 000	000 000 011 010
2	Rem -= DIV	000 000	000 011 100 000	111 100 111 010
	Rem<0 → +DIV	000 000	000 011 100 000	000 000 011 010
	sll Q, Q_0 = 0			
	srl DIV	000 000	000 001 110 000	000 000 011 010
3	Rem -= DIV	000 000	000 001 110 000	111 110 101 010
	Rem<0 → +DIV	000 000	000 001 110 000	000 000 011 010
	sll Q, Q_0 = 0			
	srl DIV	000 000	000 000 111 000	000 000 011 010
4	Rem -= DIV	000 000	000 000 111 000	111 111 100 010
	Rem<0 → +DIV	000 000	000 000 111 000	000 000 011 010
	sll Q, Q_0 = 0			
	srl DIV	000 000	000 000 011 100	000 000 011 010
5	Rem -= DIV	000 000	000 000 011 100	111 111 111 010
	Rem<0 → +DIV	000 000	000 000 011 100	000 000 011 010
	sll Q, Q_0 = 0			
	srl DIV	000 000	000 000 001 110	000 000 011 010
6	Rem -= DIV	000 000	000 000 001 110	000 000 001 100
	Rem≥0	000 001	000 000 001 110	000 000 001 100
	sll Q, Q_0 = 1			
	srl DIV	000 001	000 000 000 111	000 000 001 100
7	Rem -= DIV	000 001	000 000 000 111	000 000 000 101
	Rem≥0	000 011	000 000 000 111	000 000 000 101
	sll Q, Q_0 = 0			
	srl DIV	000 011	000 000 000 011	000 000 000 101

∴ Quotient $= 100\ 011_2 \to -3_{10}$

Remainder $= 100\ \cancel{000}\ 000\ 101_2 \to -5_{10}$

Quotient: 100100 = -4 base10, Remainder = 100 000 000 001 = -1 base10

3.7.5)

b. $35_8 \div 47_8 \rightarrow 1[11\ 101_2] \div 1[00\ 111_2]$

iteration	step	DIV	remainder
0	init vals	000 111	000 000 011 101
	sll Rem	000 111	000 000 111 010
1	Rem -= DIV	000 111	111 001 011 101
	Rem < 0	000 111	000 001 110 100
2	Rem -= DIV	000 111	111 010 110 100
	Rem < 0	000 111	000 011 101 000
3	Rem -= DIV	000 111	111 100 101 000
	Rem < 0	000 111	000 111 010 000
4	Rem -= DIV	000 111	000 000 010 000
	Rem ≥ 0	000 111	000 000 100 001
5	Rem -= DIV	000 111	111 001 100 001
	Rem < 0	000 111	000 001 000 010
6	Rem -= DIV	000 111	111 001 100 001
	Rem < 0.	000 111	000 010 000 100
7	Rem -= DIV	000 111	111 111 000 100
	Rem < 0	000 111	000 100 001 000
Fin	srl Rem left half		000 001 000 1000

∴ Quotient $= 100\ 100_2 = -4_{10} = 42_8$

remainder $= 100\ 001_2 = -1_{10} = 41_8$

3.7.5)

a. $72_8 \div 07_8 \rightarrow 1[11\ 010_2] \div 0[00\ 111_2] \rightarrow -26_{10} \div 7_{10}$

iteration	step	DIV	remainder
0	init vals	000 111	000 000 011 010
	sll Rem		000 000 110 100
1	Rem -= DIV	000 111	111 001 110 100
	Rem < 0	000 111	000 000 110 100
2	Rem -= DIV	000 111	111 001 110 100
	Rem < 0	000 111	000 001 101 000
3	Rem -= DIV	000 111	111 010 110 100
	Rem < 0	000 111	000 011 010 000
4	Rem -= DIV	000 111	111 010 110 100
	Rem < 0	000 111	000 110 100 000
5	Rem -= DIV	000 111	111 111 100 000
	Rem < 0	000 111	001 101 000 000
6	Rem -= DIV	000 111	000 110 000 000
	Rem ≥ 0	000 111	001 100 000 001
7	Rem -= DIV	000 111	000 101 000 001
	Rem ≥ 0	000 111	001 010 000 011
Fin	srl R left half		000 101 000 011

∴ Quotient $= 100\ 011_2 \rightarrow 43_8 \rightarrow -3_{10}$

∴ remainder $= 100\ 101_2 \rightarrow 45_8 \rightarrow -5_{10}$

3.10.1)

3.10.1) a. 0x0C000000

0000 1100 0000 0000 0000 0000 0000 0000

2's complement & unsigned — $2^{26} + 2^{27} = 201326592$

b. 0x C4630000

1100 0100 0110 0011 0000 0000 0000 0000

2's complement — $-2^{31} + 2^{30} + 2^{26} + 2^{22} + 2^{21} + 2^{17} + 2^{16}$

$= -1000144896$

unsigned — 3294822400

3.10.3)

3.10.3) a. 0x0C000000

$\underbrace{0000\ 1100\ 0}_{\text{exponent (24)}}[000\ 0000\ 0000\ 0000\ 0000\ 0000]$

sign (0) exponent (24) Fraction (0)

$\text{Decimal} = (-1^{\text{sign}}) \times 2^{\text{exp} - \text{bias}} \times (1 + \text{Fraction})$

$= (-1^{0}) \times 2^{24-127} \times (1+0)$

$= 1.0 \times 2^{-103}$

b. 0x C4630000

$\underbrace{1100\ 0100\ 0}_{\text{exp}}[110\ 0011\ 0000\ 0000\ 0000\ 0000]$

sign (1) exp (Fraction (0.7734375)

$\text{Decimal} = (-1^{1}) \times 2^{136-127} \times (1 + 0.7734375) = -1.7734375$

$= -1.7734375 \times 2^{9}$

3.10.4)

3.10.4)

a. $63.25_{10} \to 111111.01 \times 2^0 \to 1.1111101 \times 2^5$, sign = + → 0, exp = 5 → 127 + 5 = 132

$2 \,|\, 63$
$2 \,|\, 31$ R1
$2 \,|\, 15$ R1
$2 \,|\, 7$ R1
$2 \,|\, 3$ R1
$2 \,|\, 1$ R1
0 R1

$0.25 \times 2 = 0.5$
$0.5 \times 2 = 1.0$

0 1000 0100 1111 1010 0000 0000 000

= 0100 0010 0111 1101 0000 0000 0000 0000

b. $146987.40625_{10} \to 1000\,11111000\,101011.011010 \times 2^0$
$1\,000\,11111\,000\,1010\,1110\,11010 \times 2^{17}$ sign = + → 0, exp = 17 → 127 + 17 = 144
= 0 100 0001 0000 0001 1111 0001 0101 1011 0100. 0000 0000
0000 0000 0000 0000 0000

3.10.5)

5) $63.25_{10} \to 111\,111.01 \times 2^0 \to 1.111101 \times 2^5$, sign = + → 0, exp = 1023 + 5 = 1028
= 0 100 0000 0100 1111 1010 0000 0000 0000 0000 0000 0000
0000 0000 0000 0000 0000

b. sign = + → 0
exp = 17 + 1023 = 1040
= 0 100 0001 0000 0001 1111 0001 0101 1011 0100 0000
0000 0000 0000 0000 0000 0000

Hilroy