

CUE

HW#2

1) a. ~~0xCAF~~ 0xCAFE

~~0x~~ C A F E
0x 1100 1010 1111 1110 ↳
1100 1010 1111 1101
0011 0101 0000 0010

$$\begin{aligned}\therefore 0x\text{CAFE} &= -(3 \times 16^3 + 5 \times 16^2 + 0 \times 16 + 2) \\ &= -13570 \text{ ten}\end{aligned}$$

b. ~~0x4DAD~~ 0x4DAD

4 D A D
0100 1101 1010 1101 ↳
 $\therefore 0x\text{4DAD} = 4 \times 16^3 + 13 \times 16^2 + 10 \times 16 + 13$ ten
= 19885 ten

c. ~~0xFACE~~ 0xFACE

F A C E
1111 1010 1100 1110 ↳
1111 1010 1100 1101
0000 0101 0011 0010

$$\begin{aligned}\therefore 0x\text{FACE} &= -(0 \times 16^3 + 5 \times 16^2 + 3 \times 16 + 2) \\ &= -1330 \text{ ten}\end{aligned}$$

2) a. -1314_{ten}

1314
290 1×1024
290 0×512
34 1×256
34 0×128
34 0×64
2 1×32
2 0×16
2 0×8

$$\begin{array}{r} 2 | 0x4 \\ 0 | 0x2 \\ 0 | 0x1 \\ \hline 13 \end{array}$$

$1314_{\text{ten}} = 101000100010_{\text{two}}$
 $= 0x00000522$

Summary

$$\begin{aligned}\therefore 1314_{\text{ten}} &= 010100100010_{\text{two}} \\ \therefore -1314_{\text{ten}} &= 1010, 1101, 1110_{\text{two}} \\ &\quad A \quad D \quad E \\ \therefore -1314_{\text{ten}} &= 0xFFFFFADE\end{aligned}$$

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b. 2020

2020	
1016	1×1024
504	1×512
248	1×256
120	1×128
56	1×64
24	1×32
8	1×16
8	1×8
0	0×4
0	0×2
0	0×1

$$\therefore 2020_{\text{ten}} = 0111,1111,1000_2$$

~~7 F 8~~
~~= 0x00000778~~

$$= 0x00000778$$

$$3) a. -0.1875 = (-1) \times 3 \times 2^{-4}$$

$$= (-1) \times 0011 \times 2^{-(0000)}$$

$$= (-1) \times 0011 \times 2^{\text{two}}$$

$$= -1 \times 0011 \times 2^{-4}$$

$$= -1 \times 1.1 \times 2^{-3}$$

$$= \cancel{-1} \times \cancel{1.1} \times 2^{-3} \cancel{0011}$$

$$\text{Fraction} = 1000.0000_2 \dots 0 \cancel{0011}$$

$$\text{Exponent} = -3 + 127_{\text{ten}}$$

124	
60	1×64
28	1×32
12	1×16
4	1×8
0	1×4
0	0×2
0	0×1

Summary

$$\therefore 1011,1100,1000 \dots 0_2$$

$$B \quad E \quad 4 \quad 00000$$

$\therefore \text{BE400000 IEEE hex-single}$

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$$\text{b. } 0.46875 = (-1)^0 \times 1.5 \times 2^{-5}$$

$$= (-1)^0 \times 1\underset{\text{two}}{111} \times 2^{-5}$$

$$= (-1)^0 \times 1.11\underset{\text{two}}{1} \times 2^{-5}$$

$$\text{Fraction} = 111\underset{\text{two}}{000\dots0}$$

$$\text{Exponent} = -5 + (27)_{\text{ten}}$$

$$= 125_{\text{stem}}$$

$$= 0111\underset{\text{two}}{110}$$

$$\begin{array}{r} 125 \\ 61 \\ 29 \\ 13 \\ 5 \\ 1 \end{array} \quad \begin{array}{l} | \\ \times 64 \\ | \\ \times 32 \\ | \\ \times 16 \\ | \\ \times 8 \\ | \\ \times 4 \\ | \\ \times 2 \\ | \\ \times 1 \end{array}$$

$$\therefore 0.011110_2 = 111\underset{\text{two}}{000\dots0}$$

$$3 \quad E \quad F \quad 00000 \quad 0$$

$$\therefore \del{3EF00000} \text{ IEEE hex-single}$$

$$4) \text{ g. } 3F400000$$

~~$$\begin{array}{r} 3 \quad F \quad 4 \quad 00000 \\ 0011 \quad 1111 \quad 0100 \quad 000\underset{\text{two}}{1\dots0} \\ \downarrow \qquad \downarrow \qquad \downarrow \qquad \downarrow \\ 20 \end{array}$$~~

$$\therefore \del{3F400000} = (-1)^0$$

$$0111\underset{\text{two}}{110} = 0 \times 2^7 + 1 \times 2^6 + 1 \times 2^5 + 1 \times 2^4 + 1 \times 2^3 + 1 \times 2^2 + 1 \times 2^1 + 0 \times 1$$

$$= \del{126}$$

$$= -1 + (27)_{\text{ten}}$$

$$\therefore 3F400000 = (-1)^0 \times 1.100\dots0 \times 2^{-1}$$

$$= 11 \times 2^{-2}$$

$$= 3 \times 2^{-2}$$

$$= 0.75_{\text{ten}}$$

Summary

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b. BE000000

$$\begin{array}{r} \cancel{\text{B}} \quad \text{E} \quad 000000 \\ \cancel{1} \cancel{0} \quad 1 \cancel{1} 0 \quad \cancel{0} \cancel{0} \cancel{0} \cancel{0} \\ \hline 1 \cancel{0} 1 \end{array}$$

$$\begin{aligned} 01111100_{\text{two}} &= 0 \times 2^7 + 1 \times 2^6 + 1 \times 2^5 + 1 \times 2^4 \\ &\quad + 1 \times 2^3 + 1 \times 2^2 + 0 \times 2 + 0 \times 1 \\ &= 124 \\ &= -3 + 127 \end{aligned}$$

$$\begin{aligned} \therefore \text{BE000000} &= -1 \times 1.00 \cdots_{\text{two}} \times 2^{-3} \\ &= -1 \times 1 \times 2^{-3} \\ &= -0.125 \text{ ten} \end{aligned}$$

5) Comets are awesome! 'o'

~~comet~~
~~bf~~

comet 5 are awe
43 6F 6D 65 74 73 61 72 65 61 77 65
20 20
some! 'o'
73 6F 6D 65 21 00

~~436F 6D65 7473 2061 7265 2061~~
~~7765 736F 6D65 2100~~

$\therefore 436F 6D65$
 $7473 2061$
 $7265 2061$
 $7765 736F$
 $6D65 2100$

Summary