

## Problem #6 Conversions

① Convert to Binary, Octal, and Hex

Ⓐ  $3.75_{10}$

$$3_{10} = \underline{3}_{16}$$

$$0.75_{10} = 12_{16} = \underline{C}_{16}$$

$$= \boxed{3.C_{16}}$$

$$\underline{3.C}_{16} \rightarrow \text{---}_2$$

$$\underbrace{0011}_3 . \underbrace{1100}_{C(14)}_{16} = \boxed{11.11_2}$$

$$11.11_2 \rightarrow \text{---}_8$$

$$\underbrace{011}_3 . \underbrace{110}_6 = \boxed{3.6_8}$$

Ⓑ  $0.7_{10}$

$$0.7_{10} = 0_{16}$$

$$0.7_{10} = 11.2_{16} = B333\underline{3}$$

$$= \boxed{0.B3_{16}}$$

$$\underline{0.B3}_{16} \rightarrow \text{---}_2$$

$$0.1011 \underline{0011} \underline{0011} = \boxed{0.1011 \underline{0011}_2}$$

$$\underbrace{000}_{0.} . \underbrace{1011}_{5} \underbrace{0011}_{4} \underbrace{0011}_{6} \underbrace{0011}_{3} = \boxed{0.5463_8}$$



③  $89.9_{10}$

$$89/10 = \underline{5.5625} \quad 0.5625 \cdot 10 = \underline{5}$$

$$0.9_{10} \rightarrow \text{---}_{10} = 0.9 \cdot 10 = \underline{9}$$

$$0.4 \cdot 10 = \underline{4}$$

$$= \boxed{59.E6_{10}}$$

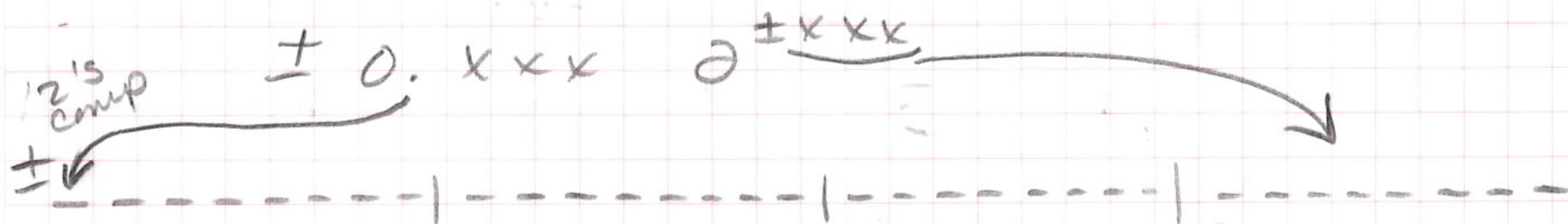
$$59.E6_{10} \rightarrow \text{---}_2 = \boxed{1011001.111001100}_2$$

$\overset{5}{0} \overset{9}{0} \overset{1}{0} \overset{1}{1} \overset{0}{0} \overset{1}{1}$	$\overset{E}{1} \overset{6}{1} \overset{1}{0}$	$\overset{6}{0} \overset{1}{1} \overset{0}{0}$	$\overset{6}{0} \overset{1}{1} \overset{0}{0}$	$\overset{6}{0} \overset{1}{1} \overset{0}{0}$	$\overset{6}{0} \overset{1}{1} \overset{0}{0}$
<u>1</u> <u>3</u> <u>1</u>	<u>7</u> <u>1</u> <u>4</u>	<u>6</u> <u>3</u> <u>1</u>			

$$= \boxed{131.71463_8}$$



② Convert to NASA hex float w/ first 24 bits representing the signed fraction and the last 8 bits representing the signed exponent  
Scaled as  $0.FRACTION \times 2^{EXONENT}$



①  $0.375_{10} = 11.11_2 = 0.1111 \times 2^{-2}$

±2's comp 0000 0010  
1111 1101  
1111 1110<sup>+</sup>

0.111, 1000, 00000000, 00000000, 1111, 1110

7 8 0 0 0 0 F E

780000FE

②  $0.7_{10} = 0.1011 \underline{0011}_2$  don't need to move the decimal????  
so put 0 as exponent?  
 $2^0$

0.101, 1001, 1001, 1001, 1001, 1001, 0000, 0000

5 9 9 9 9 9 0 0

59999900?

599999?





$$\begin{aligned}
 \textcircled{1} \quad 89.9 &\rightarrow 0.\underline{1011001}.\underline{111001100}_2 \\
 &= 0.101100111\underline{001100} \times 2^{-7}
 \end{aligned}$$

$\begin{array}{r} 0000\ 0111 \\ 1111\ 1000 \\ 1111\ 1001 + 1 \end{array}$

$$\begin{array}{cccccccc}
 0. & 1011 & 0011 & 1100 & 1100 & 1100 & 1100 & 1100 \\
 \hline
 5 & 9 & F & 3 & 3 & 3 & F & 9
 \end{array}$$

59F333F9

I did not complete steps 3-5

I don't remember covering scaled binary in class

BUT I waited until the last minute to do this problem. There were plenty of opportunities to ask about this in class as I had started this problem earlier