

a) 5.75_{10} b) 0.9_{10} c) 99.7_{10}

1) Convert to binary, octal, and hex

a) $5.75_{10} \times 2^2 = 23$ 101.10_2 0101.1100_2
 $23/2 = 11r1$ $= 5.6_8$ $= 5.C_{16}$
 $11/2 = 5r1$
 $5/2 = 2r1$
 $2/2 = 1r0$
 $1/2 = 0r1$
 $= 10111_2 / 2^2$
 $= 101.11_2$

b) $0.9_{10} \times 2^8 = 230$ 0.111001100_2 0.111001100_2
 $230/2 = 115r0$ $= 0.714_8$ $= 0.E6_{16}$
 $115/2 = 57r1$
 $57/2 = 28r1$
 $28/2 = 14r0$
 $14/2 = 7r0$
 $7/2 = 3r1$
 $3/2 = 1r1$
 $1/2 = 0r1$
 $= 011100110_2 / 2^8$
 $= 0.11100110_2$

c) $99.7_{10} \times 2^8 = 25523$

$25523/2 = 12761r1$	$49/2 = 24r1$	1100011.10110011_2
$12761/2 = 6380r1$	$24/2 = 12r0$	$= 143.54631_8$
$6380/2 = 3190r0$	$12/2 = 6r0$	
$3190/2 = 1595r0$	$6/2 = 3r0$	1100011.10110011_2
$1595/2 = 797r1$	$3/2 = 1r1$	$= 63.B3_{16}$
$797/2 = 398r1$	$1/2 = 0r1$	
$398/2 = 199r0$		
$199/2 = 99r1$	$= 110001110110011 / 2^8$	
$99/2 = 49r1$	$= 1100011.10110011_2$	

2) Convert to NASA Hex float

a) $5.57_{10} = 101.11_2 = 0.10111_2 \times 2^3$

$$\begin{array}{ccccccc} 0.101 & 1100 & | & 0000 & 0000 & | & 0000 & 0000 & | & 0000 & 0011 \\ 5 & C & & 0 & 0 & & 0 & 0 & & 0 & 3 \\ = & \boxed{5C000003} \end{array}$$

b) $0.9_{10} = 0.11100110_2 \times 2^0$

$$\begin{array}{ccccccc} 0.111 & 0011 & | & 0011 & 0011 & | & 0011 & 0011 & | & 0000 & 0000 \\ 7 & 3 & & 3 & 3 & & 3 & 3 & & 0 & 0 \\ = & \boxed{73333300} \end{array}$$

c) $99.7_{10} = 1100011.10110011_2 = 0.110001110110011_2 \times 2^7$

$$\begin{array}{ccccccc} 0.110 & 0011 & | & 1011 & 0011 & | & 0011 & 0011 & | & 0000 & 0111 \\ 6 & 3 & & B & 3 & & 3 & 3 & & 0 & 7 \\ = & \boxed{63B33307} \end{array}$$

3) Convert a) to scaled integer binary 1 unsigned byte max bits

$$\begin{array}{l} 5.57_{10} = 101.11_2 \\ = \boxed{1011000_2 \times 2^{-5}} \end{array}$$

Convert b) to scaled integer binary 2 unsigned bytes max bits.

$$\begin{array}{l} 0.9_{10} = 0.11100110_2 \\ = \boxed{1110011001100110_2 \times 2^{-16}} \end{array}$$

Convert c) to scaled integer binary 3 unsigned bytes max bits

$$\begin{array}{l} 99.7_{10} = 1100011.10110011_2 \\ = \boxed{110001110110011001100110_2 \times 2^{-17}} \end{array}$$

5) Convert to IEEE 754 format

a) $\|q\|_2 = 1,011 \times 2^2$

$01000000101110000000000000000000$
 $4 \quad 0 \quad B \quad 8 \quad 0 \quad 0 \quad 0 \quad 0$
 $= \boxed{40B80000}$

$$b) 0,1110011_2 = 1,1100 \times 2^{-1}$$

$0101111101110011001100110011001100110$
 $\quad 3 \quad F \quad 6 \quad 6 \quad 6 \quad 6 \quad 6 \quad 6$
 $= \boxed{3F666666}$

c) $11,00011,101100_2 = 1,100011101100_2 \times 2^{-6}$

$\begin{array}{|c|c|c|c|c|c|c|c|} \hline 0 & 0 & 1 & 1 & 0 & 0 & 1 & 1 \\ \hline 3 & C & C & 7 & 6 & 6 & 6 & 6 \\ \hline \end{array}$

= 3CC76666