

21) 1) $51 = 00111011$
 $77 = 01001101$

 $-128 = 10000000$

* Note this would be -128; range of signed 8-bit ints is 127 to -128

$$\begin{array}{r} 2) \quad 53 = 00110101 \\ -112 = 10010000 \\ \hline -59 = 11000101 \end{array}$$

$$\begin{array}{r} 112 = 01110000 \\ -112 = 10001111 \\ \hline -112 = 10010000 \end{array}$$

$$\begin{array}{r} 3) \quad 35 = 00100011 \\ - 23 = 11101001 \\ \hline 12 = 00001100 \end{array}$$

$$\begin{array}{r} 23 = 00010111 \\ - 24 = 10001000 \\ \hline - 23 = 11101001 \end{array}$$

$$\begin{array}{r} 4) \quad 87 = 010'10111 \\ \quad 12 = 00001100 \\ \hline \quad 99 = 01100011 \end{array}$$

$$\begin{array}{r} 5) -75 = 10110101 \\ -54 = 11001010 \\ \hline 127 = 01111111 \end{array}$$

$$\begin{array}{rcl} 75 & = & 01001011 \\ -76 & = & 10110100 \\ -75 & = & 10110101 \end{array} \qquad \begin{array}{rcl} 54 & = & 00110110 \\ -55 & = & 11001001 \\ -54 & = & 11001010 \end{array}$$

(Example of underflow: min. value storable is -128 , while $-75-54 = -129$).

22) 1) $(1.000.)_{10} = (1.000...)_{2}$

$$\therefore \text{sign} = 0, \text{ exponent} = 01111111 \quad (127 - 127 = 0)$$

Magnitude Intissa = 0000 0

Ans = 00111111000000000000000000000000

$$\begin{aligned} 2) (12.375)_{10} &= (1100.011)_2 \\ &= (1.100011)_2 \times 2^3 \end{aligned}$$

$\therefore \text{sign} = 0, \text{exponent} = 10000010, \text{Mantissa} = 10001100 \dots 0$
(130-127=3)

$$\therefore \text{ans} = 01000001010001100000000000000000$$

$$\begin{aligned} 3) -0.25 &= -(0.01)_2 \\ &= -(1)_2 \times 2^{-2} \end{aligned}$$

$$\therefore \text{sign} = 1, \text{exponent} = 01111101 \text{ (125-127 = -2)}, \text{Mantissa} = 0$$

$$\therefore \text{ans} = 10111101000000000000000000000000$$