1T. 解: for $-\frac{17}{64}$ the binary is -0.010001

as the machine number is 8 bits long (1 bit for sign)

so the $[-\frac{17}{64}]_{TF} = 1.0100010$

$[\frac{-17}{64}]_{1'} = 1.1011101$

$[\frac{-17}{64}]_{2'} = 1.1011110$

for $\frac{93}{128}$ the binary is $+0.1011101$

so the $[\frac{93}{128}]_{TF} = 0.1011101$

$[\frac{93}{128}]_{1'} = 0.0100010$

$[\frac{93}{128}]_{2'} = 0.0100011$

for 100 the binary is $+1100100$

so the $[100]_{TF} = 0,1100100$

$[100]_{1'} = 0,0011011$

$[100]_{2'} = 0,0011100$

for -73 the binary is -1001001

so the $[-73]_{TF} = 1,1001001$

$[-73]_{1'} = 1,0110110$

$[-73]_{2'} = 1,0110111$

for $-\frac{4}{7}$ the binary is

$\frac{4}{7}\times 2 = \frac{8}{7} \rightarrow 1$

$(\frac{8}{7}-1)\times 2 = \frac{2}{7} \rightarrow 0$

$\frac{2}{7}\times 2 = \frac{4}{7} \rightarrow 0$

$\frac{4}{7}\times 2 = \frac{8}{7} \rightarrow 1$ (the same as the first step)

so the binary is -0.1001001

Thus the $[-\frac{4}{7}]_{TF} = 1.1001001$

$[-\frac{4}{7}]_{1'} = 1.0110110$

$[-\frac{4}{7}]_{2'} = 1.0110111$

2T. 解: from $[x]_{TF}$ to $[x]_{2'}$, we first get the invert by bit (except sign bit) and add 1 at the end position. Thus from $[x]_{2'}$ to $[x]_{TF}$, we first minus 1 at the end position and then invert by bit (except sign bit)

So for $[X_1]_{2'} = 1.1100$ $[X_1]_{TF} = 1.0100$ $x_1 = -\frac{1}{4}$

$[X_2]_{2'} = 1.1001$ $[X_2]_{TF} = 1.0111$ $x_2 = -\frac{7}{16}$

$[X_3]_{2'} = 0.1110$ $[X_3]_{TF} = 0.1110$ $x_3 = \frac{7}{8}$

$[x_4]_{y'} = 1.0000$ $[x_4]_{TF}$ no exist. $x_4 = -1$ (no express -1 as a decimal)

$[x_5]_{y'} = 1,0101$ $[x_5]_{TF} = 1,1011$ $x_5 = -11$

$[x_6]_{y'} = 1,1101$ $[x_6]_{TF} = 1,0011$ $x_6 = -3$

$[x_7]_{y'} = 0,0111$ $[x_7]_{TF} = 0,0111$ $x_7 = 7$

$[x_8]_{y'} = 1,0000$ $[x_8]_{TF} = 1,10000$ $x_8 = -16$

(5 bits long if it only has 4 bits may produce loss , 1,0000)

3.7 解: (1) for it is represented by IEEE 754 short in computer

So there are 32 bits would be in FR1

(2) for $x = -8.25$ the binary is -1000.01

for 1000.01 the binary floating point representation is 1.00001×2^{11}

Thus the exponent is $00000011 + 01111111 = \underbrace{10000010}_{8}$

the Significand is $\underbrace{00001000000000000000000}_{23}$

So the finally code is

1 10000010 00001000000000000000000

4.7. 解: (45100000H) = 0100 0101 0001 0000 0000 0000 0000 0000

So the sign is 0 the exponent is 10001010

the significand is 001 0000 0000 0000 0000 0000

for the exponent is added 0111 1111 when calculated

So the exponent should be $10001010 - 01111111 = 00001011$

for the significand omit 1 at the first

So the binary floating point representation is 1.001×2^{1011}

Thus the binary is $+100100000000$

Thus the True value of 45100000H is $+2304$

解: the greatest positive appear when the biased representation is 111111 and the mantissa is 0.00000001

the true form of the biased representation is +111111

the true form of the mantissa is +11111111

Thus the greatest positive is $0.11111111 \times 2^{111111} = (1-2^{-8}) \times 2^{127}$

the minimum positive appear when the biased representation is 000001 and the mantissa is 0.11111111

the true form of the biased representation is -111111

the true form of the mantissa is 0.00000001

Thus the minimum positive is $0.00000001 \times 2^{-111111} = 2^{-8} \times 2^{-127}$

So the greatest negative is $-2^{-8} \times 2^{-127}$

2. for. $[a+b]_{2'} = [a]_{2'} + [b]_{2'}$

(1) $[a]_{TF} = 1,011$. $[b]_{TF} = 1,100$

Thus $[a]_{2'} = 1,101$ $[b]_{2'} = 1,100$

So
$$\begin{array}{r} 1,101 \\ +\ 1,100 \\ \hline 11,001 \end{array} \leftarrow [a+b]_{2'} = 1,001$$

Thus there is no overflow

the result in true value is $1,111 = -7$

(2) $[a]_{TF} = 1,0101$. $[b]_{TF} = 0,1010$

Thus $[a]_{2'} = 1,1011$ $[b]_{2'} = 0,1010$

So
$$\begin{array}{r} 1,1011 \\ +\ 0,1010 \\ \hline 10,0101 \end{array} \leftarrow [a+b]_{2'} = 0,0101$$

Thus there is no overflow

the result in true value is $0,0101 = 5$

(3) $[a]_{TF} = 1,1000$ $[b]_{TF} = 1,1001$

So $[a]_{2'} = 1,1000$ $[b]_{2'} = 1,0111$

Thus
$$\begin{array}{r} 1,1000 \\ +\ 1,0111 \\ \hline 10,1111 \end{array} \leftarrow [a+b]_{2'} = 0,1111$$

Thus there is an overflow

(4) $[a]_{TF} = 11,01000$ $[b]_{TF} = 11,01001$

$[a]_{2'} = 11,11000$ $[b]_{2'} = 11,10111$

Thus
$$\begin{array}{r} 11,11000 \\ +\ 11,10111 \\ \hline 111,01111 \end{array} \leftarrow [a+b]_{2'}$$

Thus there is no overflow

the result in true value is

$1,10001 = -17$.