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Q1)

Option 2)

a) 121 : 2 = 60 → remainder 1
60 : 2 = 30 → " 0
30 : 2 = 15 → " 0
15 : 2 = 7 → " 1
7 : 2 = 3 → " 1
3 : 2 = 1 → " 1
1 : 1 = 1 → " 1

binary rep. is 1111001

$\frac{113}{1024} \cdot 2 = \frac{226}{1024} \rightarrow 0$

$\frac{226}{1024} \cdot 2 = \frac{452}{1024} \rightarrow 0$

$\frac{452}{1024} \cdot 2 = \frac{904}{1024} \rightarrow 0$

$\frac{904}{1024} \cdot 2 = \frac{1808}{1024} \rightarrow 1$

$\frac{1808}{1024} - 1 = \frac{784}{1024} \cdot 2 = \frac{1568}{1024} \rightarrow 1$

(cont.)

$\frac{1568}{1024} - 1 = \frac{544}{1024} \cdot 2 = \frac{1088}{1024} \rightarrow 1$

$\frac{128}{1024} \rightarrow 0$

$\frac{256}{1024} \rightarrow 0$

$\frac{512}{1024} \rightarrow 0$

$\frac{1024}{1024} = 1$

$$\left(\frac{113}{1024}\right)_{10} = (0,0001110001)_2$$

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Q1)

b) $\frac{2}{7} = 0,0100\overline{\ldots}$

$1,\overline{\ldots} \times 2^{-2}$

23 bit after comma

Sign bit = 0

$e - 127 = -2$

$e = 125 = (1111101)_2$

frac = 00100100100100100100100

↳ single precision → 0 1111101 00100100100100100100100

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c)

first digit = 1 (number is neg.)

after eight bit = 00011101 → 29 (29 − 127 = −98)

frac. → 011100 / all zero · 2^{-98}

↳ $-1.(1.0111) \cdot 2^{-98}$

↳ $-1.10111 \cdot 2^{-4} \cdot 2^{-98}$

↳ $-1.23 \cdot 2^{-112}$

↳ -23.2^{-112}

$\frac{1568}{1024} - 1 = \frac{544}{1} \cdot 2 = 1088$

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Q2) option 1

for 1 : 2, 5

for 2 : 3, 4, 5

for 3 : 1, 4, 5, 6

for 4 : 1

for 5 : 1, 2, 3, 4, 6

for 6 : 4, 5