2el

① $3.984375 \times 10^{-1} + (3.4375 \times 10^{-1} + 1.771 \times 10^{3})$

$\begin{cases} 3.984375 \times 10^{-1} = 0.3984375 \times 10^{0} = 0.011011 = 1.1011 \times 2^{-2} \\ 3.4375 \times 10^{-1} = 0.34375 \times 10^{0} = 0.01011 = 1.011 \times 2^{-2} \\ 1.771 \times 10^{3} = 1771 = 11011101011 = 1.10111010111 \times 2^{10} \end{cases}$

$0.3.4375 + 1771 = 11011101011$

0.01011

11011101011.01011 Round up.

11011101011

$3.984375 \times 10^{-1} + (3.4375 \times 10^{-1} + 1.771 \times 10^{3}) = 11011101011.$

0.011011

11011101011.011011

$11011101011 \rightarrow 1771.$

$2 \rightarrow 10$

← round up

So the answer of this question is 1771.

② the bit pattern of $-\frac{1}{4}$ is $0.01 = 1 \times 2^{-2}$. $-2+127=125$.

~~Exponent bias~~ = sign + exponent + fraction

Floating point converter (1 bit) (8 bit) (23 bit) = 32 bit.

-1 2^{-2} 1.0

(1) (125) (0)

Exponent bias = 1 01111101 00000000000000000000000

Floating point converter: 1 | 125 | 23 → 0. all 0.

~~add $-\frac{1}{4}$ to itself four time? $-\frac{1}{4}+-\frac{1}{4}+-\frac{1}{4}+-\frac{1}{4}$ like that?~~

or $-\frac{1}{4}+-\frac{1}{4}+-\frac{1}{4}+\frac{1}{4}=-1$

$-\frac{1}{4}\times 4=-1$ if it the type of adding itself will be same.

but if add itself is type 0 they will not same

for 1. the Floating Point Converter = 01 01111111 00000000000000000000

~~for $\frac{5}{4}$ the Floating Point Converter = 1 01111111 01000000000000000000000~~

3.

~~Register Read + IMem + Sign extend + Mux + Register Read + Mux + ALU + Mux + Register Write~~

R

Read + IMem + File + Mux + ALU + Mux + setup

$= 30 + 250 + 150 + 25 + 200 + 25 + 20$

$= 700$ ps

ld

Read + IMem + File + Mux + ALU + DMem + Mux + setup

$= 30 + 250 + 150 + 25 + 200 + 250 + 25 + 20$

$= 950$ ps

sd.

Read + IMem + File + ALU + Mux + DMem

$= 30 + 250 + 150 + 200 + 25 + 250$

$= 905$ ps

beq

Read + IMem + Adder + Mux + ALU + single gate + Mux + setup

$= 30 + 250 + 150 + 25 + 200 + 1 + 25 + 20$

$= 701$ ps

Lee

2. Read + 2Mem + File + Mux + ALU + Mux + Setup
= 30 + 250 + 150 + 25 + 200 + 25 + 20
= 700ps

R-type	700ps
ld	950ps
sd	905ps
beq	705ps
J	700ps

because the longest one determines clock period so for this CPU 950 ps is the minimum clock period

4.

R-type / J-type	12%
ld	25%
sd	11%
beq	12%

R / J = 700 · 52% = 364 ps
ld = 950 · 25% = 237.5 ps
sd = 905 · 11% = 99.55 ps
beq = 705 · 12% = 84.6 ps

new CPU clock period = 364 + 237.5 + 99.55 + 84.6 = 785.65 ps

speedup = $\frac{950}{785.65}$ = 1.20918984 ≈ 1.21