(2) Overall CPI

$(1 \times .3) + (4 \times .2) + (9 \times .4) + (2 \times .1) = 4.9$

(3) CPI = 4

freq = 2.8GHz

in 1 seconds

Time = ISA × CPI × freq.

$ISA = \frac{Time}{CPI \times freq}$

$ISA = \frac{7 \times 10^8 \text{ INSTRUCTIONS}}{1 \text{ SA}} \quad ISA = \frac{(1 \text{ second})(2.8\text{GHz})}{4}$

(4) f = 5GHz

Avg CPI =

MEMORY PERFORMANCE

Next Gen (A) vs OLD (B)

AMDAHL'S LAW

$Speedup = \frac{1}{(1-f) + \frac{f}{P}}$ ← NEW

$\frac{TIME\ B}{TIME\ A} = \frac{Performance\ A}{P\ldots B}$

$Time_B = ISA \times CPI \times freq. = 3 \times \frac{1}{5} = .6ns$

$CPI_B = 3$

$CPI_A = 2.6$ $\quad NEW_F = .9 \times OLD = 4.5GHz$

$Time_A = 2.6 \times \frac{1}{4.5} = .5777ns$

$\frac{.6ns}{.5777ns} = 1.038 = 1.04$

(5) ~~STUR LR [SP, #8]~~

→ LR 8

→ 5 × funct(3) > 8

→ LR 8

8

8

8

8

8

→ 5 × funct(3)

→ 5 × 3 × funct(1)

5 × 3 × 1 × funct(-1)

9- Ans in decimal

$1 \times (1 + .5) \times 2^{(124)}$

$2.0 \times 10^1 \rightarrow 20 \times 10^0$

1.5×2^3

150.0

150.0×2^1

-30×2^1

10 ~~00~~ $1.5 \times 2^3 \times -3.0 \times 2^2$

$1500.0 \times 2^1 \times -30 \times 2^1$

$.0015 \times 2^1$

9 0 | 1000 0001 | 111000...00 ($\frac{1}{2} + \frac{1}{4} + \frac{1}{8}$)

S | exp | mantissa

$(-1)^0$ $128 + 1 = 129$

$129 - 127 = 2$

$+ 1 \times (1 + 7/8) \times 2^{(2)} = 7.5$ ✓

7.5 | 2
3.75 | 2
1.875

.875 × 2
.75 × 2
.5 × 2

0 | 1000001 | 1110000

10 ① Add exp.

$1.5 \times 2^3 \times -3.0 \times 2^2$

. New exp = 5

② MULTIPLY SIGNIFICANDS

$1.5 \times -3.0 = -4.5$

-4.5×2^5

$-.45 \times 2^6$

⑦ main = 0x1000 } address
fact : 0x2000 }
Sp : 0x10000

10 11 12 13 14 15
9 A B C D E F

14 1101
1011

0000 00 00 0000 0000 1111 1111 1111 100000

Sp = 0x10 00 3F FE 0

LR → ~~0x8~~ 0x8 = 0x2000
X0 → ~~0x10~~ 0x0 = 0x1992
L1 →

0000 0000 0000 0000 1111 1111 1101 000000
0 0 3 F F 4 0

0000 0000 0000 0000 1111 1111 1011 100000
0 0 3 F E E 0

0x003FEE0

0 0000
1 0001
2 0010
3 0011
4 0100
5 0101
6 0110
7 0111
8 1000
9 1001
A 1010
B 1011
C 1100
D 1101
E 1110
F 1111