

PROBLEMA 5.1

a) push D
push C
sub
push B
push A
sub
div
push C
sub
pop R

b) load C
sub D
store R
load A
sub B
div R
store R
load C
sub R
store R

PROBLEMA 5.2

a) $10^9 \cdot 0'3 + 2(10^9 \cdot 0'1) = \underline{5 \cdot 10^8 \text{ accesos}}$

b) $2'5 = 10^9 \cdot 2'5 \cdot \frac{1}{f} ; f = \underline{1 \text{ GHz}}$

c) $0'9 \cdot 10^9 + 2(0'1 \cdot 10^9) + 5 \cdot 10^8 + 0'3 \cdot 5 \cdot 10^8 + 0'2 \cdot 0'7 \cdot 5 \cdot 10^8 + 0'15 \cdot 0'2 \cdot 10^9 = \underline{1'85 \cdot 10^9 \text{ instrucciones}}$

d) $2'5 = 1'85 \cdot 10^9 \cdot 1'2 \cdot \frac{1}{f} = f = \underline{0'888 \text{ GHz}}$

e) CISC: $P_f = 10 \cdot 1 = 10 \text{ W}$ $P_c = 50 \cdot 10^{-9} \cdot 1^2 \cdot 1 \cdot 10^9 = 50 \text{ W}$
 $P_T = 60 \text{ W}$ $E_T = 60 \text{ W} \cdot 2'5 \text{ s} = \underline{150 \text{ J}}$

RISC: $P_f = 8 \cdot 1 = 8 \text{ W}$ $P_c = 40 \cdot 10^{-9} \cdot 1^2 \cdot 0'888 \cdot 10^9 = 35'52 \text{ W}$
 $P_T = 43'52 \text{ W}$ $E_T = 43'52 \text{ W} \cdot 2'5 \text{ s} = \underline{108'8 \text{ J}}$

$$f) \text{ Ganancia} = \frac{150}{108.8} = \underline{1.379}$$

$$g) 2'S = \frac{1.5 \cdot 10^9 \cdot 1.3}{f} ; f = \underline{0.78 \text{ GHz}}$$

$$h) P_F = 8 \cdot 1 = 8 \text{ W} \quad P_C = 40 \cdot 10^{-9} \cdot 1 \cdot 0.78 \cdot 10^9 = 31.2 \text{ W}$$

$$P_T = 39.2 \text{ W} \quad E_T = 39.2 \cdot 2.5 = 98 \text{ J}$$

$$\text{Ganancia} = \frac{150}{98} = \underline{1.531}$$

PROBLEMA 5.3

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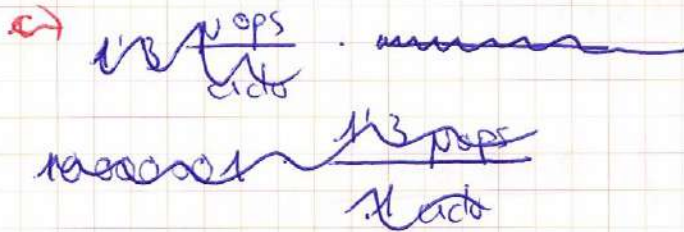
a)    movl %ecx, %eax
loop: cml %ecx, $1000000
      jge fin
      load xxxxxx %eax, %eax
      load %ecx, %ecx
      mul %ecx, %ecx
      load %ecx, %ecx
      add %ecx, %ecx
      store sume, %ecx
      addl %ecx, %ecx
      jmp loop

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fin:

$$b) 7 \cdot 10^6 + 1 = \underline{7000001 \text{ ins}}$$

$$10 \cdot 10^6 + 1 = \underline{10000001 \text{ pops}}$$



$$c) 10\,000\,001 \text{ pops} \cdot \frac{1 \text{ ciclo}}{1/3 \text{ pps}} = \frac{7692308 \text{ ciclos}}{7\,000\,001 \text{ ins}} = \underline{1'0989 \text{ c/i}}$$

$$d) T_{\text{exe}} = (7 \cdot 10^6 + 1) \cdot 1'0989 \cdot \frac{1}{3 \cdot 10^9} = \underline{2'56 \text{ ms}}$$

$$e) T_{\text{amary}} \times 86 = 5 + 5 + 5 + 2 + 1 + 2 + 1 + 5 = \underline{32 \text{ B}}$$

$$T_{\text{amary}} \text{ pops} = 11 \cdot 6 = \underline{66 \text{ B}}$$

$$f) 32 \text{ B} \cdot 10^6 \text{ int} = \underline{32 \text{ MB}} \quad \frac{32 \text{ MB}}{2'56 \cdot 10^{-3}} = \underline{12'5 \text{ GB/s}}$$

$$g) 66 \text{ B} \cdot 10^6 \text{ pops} = 66 \text{ MB} \quad \text{El ancho de banda es el mismo}$$

$$h) \text{Sin cache} \Rightarrow 11 \cdot 10^{-9} \cdot 7 \cdot 10^6 = \underline{77 \text{ mJ}}$$

$$\text{Amb cache} \Rightarrow \underline{11 \cdot 8 \cdot 10^{-9}}$$

$$11 \cdot 10^{-9} \cdot 8 + 10^{-9} \cdot (7 \cdot 10^6 - 7) = \underline{7 \text{ mJ}}$$

$$\text{Ganancia} = \frac{77}{7} = \underline{11}$$