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AC - Problemes 22/05

5.1.-

a)

```
push B
push A
sub
push D
push C
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
```

5.2.-

a) #accesos = 10^9 * 0.3 + 10^9 * 0.1 + 10^9 * 0.1 = 5*10^8

b) f = 10^9 * 2.5/2.5 = 1 GHz

c) 0.9*10^9 + 2*0.1*10^9 + 5*10^8 + 0.7*5*10^8 + 0.2*0.7*5*10^9 + 0.2*0.15*10^9 = 2.68*10^9 instrucciones

d) f = 2.68*10^9*1.2/2.5 = 1.29 GHz

e)

CISC:

Pf = 10*1=10W

Pc = 50*10^-9*1^2*10^9 = 50W

Pt = 50+10 = 60W

E = 60*2.5 = 150 J

RISC:

Pf = 8*1=8W

Pc = 40*10^-9*1^2*8.4*10^9 = 33.6W

Pt = 8+33.6 = 41.6W

E = 41.6*2.5 = 104 J

f) Ganancia = 150/104 = 1.44
g) f = 1.5*10^9 * 1.3/2.5 = 0.78 GHz
h) Pt = 8 + 40*10^-9 * 1^2 * 7.8*10^8 = 39.2 W
E = 39.2 * 2.5 = 98 J
Ganancia = 150/98 = 1.53

5.3.-

```
a)      movl %ecx <- $0
loop:   cmpl $1000000, %ecx
        jge fin
        load %eax <- x
        load %r1 <- V[%ecx + 4]
        imull %eax <- %r1
        load %r2 <- suma + %r2
        addl %eax <- %r2
        addl %ecx <- %ecx + $1
        jmp loop
fin:
```

b) instr = 1000000 * 6 + 1 = 6000001
uops = 1000000 * 9 + 1 = 9000001
c) 9000001/1.3 = 6923078 ciclos
CPI = 6923078/6000001 = 1.1538
d) T = 6000001*1.1538/3*10^9 = 2.31 ms
e) x86 = 1+1+4+1+4 = 11*6 = 66 bytes
uops = 1+1+4+1+1+4+1+4+1+1+1+4+1+1+4+1+1+1+1+4+1+1+4 = 44 bytes
f) 66*6000001+44*9000001 = 792000110 bytes; BW = 792000110/2.5 = 316 GB/s
g) 66*6000001+44 = 396000110 bytes
h) 792000110 * 10^-9 = 0.79 J; 396000110 * 10^9 = 0.396 J; Ganancia = 1.994