

AC - Problemes 22/05

1.-

- a) $CPI = \frac{1}{4} = 0.25 \text{ c/i}$
- b) $20 \cdot 4 = 80 \text{ instrucciones}$
- c) $CPI = 0.25 + 20 \cdot 0.2 = 4.25 \text{ c/i}$
- d) $4.25/0.25 = 17 \text{ veces}$
- e) $CPI = 0.25 + 20 \cdot 0.2 \cdot 0.05 = 0.45$
- f) $\text{speedup} = 4.25/0.45 = 9.44$

2.-

- a) $IPC = 10^9/10^9 = 1 \text{ i/c}$
 $OPC = 4 \text{ o/c}$
- b) $4 \cdot 1 = 4 \text{ i/c}$
- c) $\text{ciclos} = 0.6 \cdot 10^9 + 2 \cdot 0.4 \cdot 10^9 = 1.4 \cdot 10^9 \text{ ciclos}$
- d) $IPC = 10^9/1.4 \cdot 10^9 = 0.714 \text{ i/c}$
 $OPC = 2.857 \text{ o/c}$
- e) $P(\text{same as before}) = 4/16 = \frac{1}{4} = 0.25$
- f) $0.6 \cdot 10^9 + 0.25 \cdot 2 \cdot 0.4 \cdot 10^9 + 0.75 \cdot 0.4 \cdot 10^9 = 1.1 \cdot 10^9 \text{ ciclos}$
- g) $IPC = 10^9/1.1 \cdot 10^9 = 0.91 \text{ i/c}$
 $OPC = 3.64 \text{ o/c}$

3.-

- a) Menor tiempo posible = $0.15 \cdot 200 = 30h$
Max speedup = $200/30 = 6.67$
- b) $t(N) = 0.15 \cdot 200 + 0.005 \cdot N \cdot 200 + 170/N = 30 + N + 170/N$
- c) $t'(N) = 0 + 1 + 170/N^2 = 0 \rightarrow N = 13 \text{ procesadores}$
- d) Real speedup = $200/56 = 3.57$
- e) $200 \cdot 0.9 + 200 \cdot 0.1 \cdot 0.1 = 182 \rightarrow 200/182 = 1.1$
- f) $20/4 = 5h$
- g) $200 \cdot 0.05 + 26.077 + 5 = 41.077 \rightarrow 200/41.077 = 4.87$
- h) $648 \cdot 10^{13}/(200 \cdot 3600) = 9000 \text{ MIPS}$
 $72 \cdot 10^{13}/(200 \cdot 3600) = 1000 \text{ MFLOPS}$
- i) $(648+13) \cdot 10^{13}/(41.077 \cdot 3600) = 44699.3 \text{ MIPS}$
 $72 \cdot 10^{13}/(41.077 \cdot 3600) = 4868.9 \text{ MFLOPS}$
- j) PC: $90 + 30 = 120W \rightarrow 1000/120 = 8.33 \text{ MFLOPS/W}$
Super: $90 \cdot 13 + 30 \cdot 10 = 1470W \rightarrow 4868.9/1470 = 3.31 \text{ MFLOPS/W}$
- k) Consumo = $90 + 26/41 \cdot 12 \cdot 90 + 5/41 \cdot 30 \cdot 10 = 811.46 \text{ W} \rightarrow 4868.9/811.46 = 6 \text{ MFLOPS/W}$
Ganancia = $6/3.31 = 1.81$