① $Speedup = \frac{1}{(1-Fe) + \frac{Fe}{6E}} = \frac{1}{(1-0,85) + \frac{0,85}{11}} = 4,4$

②

$AMAT = Hit\ Time + Miss\ Penalty \times Miss\ Rate$

$(=) AMAT = 6,25 + 50 \times 0,3$

$(=) AMAT = 21,25$

$Miss\ Rate = 1 - Hit\ Rate = 1 - 0,7 = 0,3$

$Hit\ Time = \frac{50}{8} = 6,25$

③

a) $Speedup = \frac{1}{(1-Fe) + \frac{Fe}{6E}} \quad (=) \quad 5 = \frac{1}{(1-Fe) + \frac{Fe}{6}} \quad (=) \quad 1 - Fe + \frac{Fe}{6} = \frac{1}{5}$

$(=) Fe = \frac{24}{25} = 0,96 = 96\% \rightarrow$ Hit Ratio

b) $AMAT = Hit\ Time + Miss\ Penalty \times Miss\ Rate$

$= 5 + 30 \times 0,04$

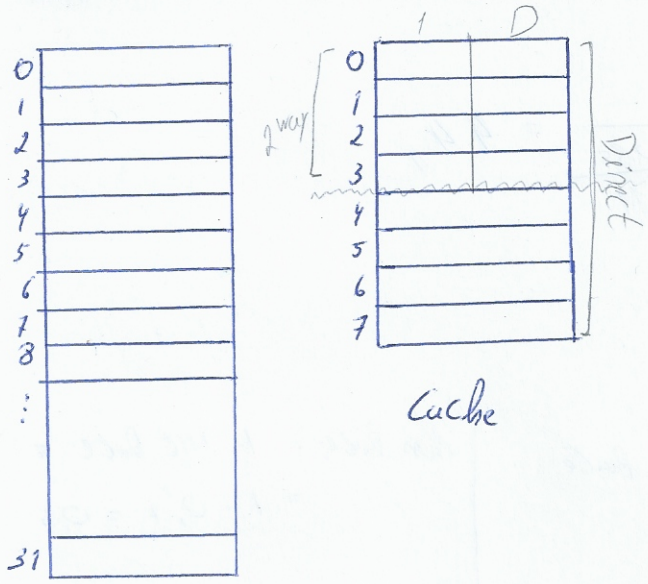
$= 6,2$

$Miss\ Rate = 1 - Hit\ Rate = 1 - 0,96 = 0,04$

④

$Speedup = \frac{1}{(1-Fe) + \frac{Fe}{6E}} = \frac{1}{(1-0,85) + \frac{0,85}{10}} = 4,26$

⑤



a) 13 mod 8 = 5 → bloco 5

b) 13 mod 9 = 4 → bloco 1

c) Em qualquer bloco

⑥

a) i) 1MB = 1048 576 bytes 1 bloco = 128 bytes

Total $\frac{\text{blocos}}{\text{bytes}} = \frac{1048\,576}{128} = 8192$ blocos ii) 8192 blocos

iii) 8192/8 = 1024

b) ii) 8192/2 = 4096 iii) 8192/8 = 1024

c) 26B = $2{,}15 \times 10^9$ bits nº de endereços = 16 777 216

$\log_2 16\,777\,216 = 24$ bits

i) tag = 24 bits / index = $\log_2 8192 = 13$ bits / offset $\log_2 128 = 7$ bits

ii) tag = 24 bits / index = $\log_2 4096 = 12$ bits / offset = 7 bits

iii) tag = 24 bits / index = $\log_2 1024 = 10$ bits offset = 7 bits

iv) tag = 24 bits / offset = 7 bits

(I) $CPI_{real} = CPI_{ideal} + Penalidade\_Cache\_instrucoes + Penalidade\_Cache\_dados$

$= 1,8 + 0,03 \times 20 + 0,3 \times 0,03 \times 0,20$

$= 1,8 + 0,6 + 0,18$

$= 2,58$

$Ganho\_final = \frac{1,8}{CPI_{ideal}} = 0,70 = 70\%$