1.

cache 命中率：$\frac{4800}{4800+200} = 96\%$

平均访问周期：$96\% \times 30 + 4\% \times 150 = 34.8$ ns

提高的倍数：$150 \div 34.8 = 4.31$

2.

$b = \log_2^{128} = 7$　　$c = \log_2^{64} = 6$

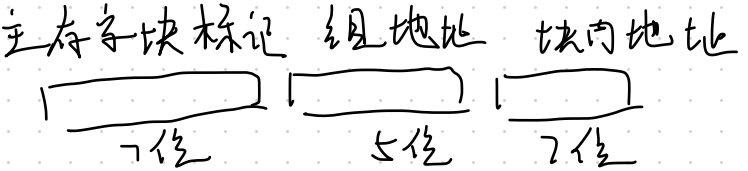
$m = \log_2^{4096} = 12$　　$r = \log_2^1 = 1$

$t = m - c = 6$　　$c' = c - r = 5$

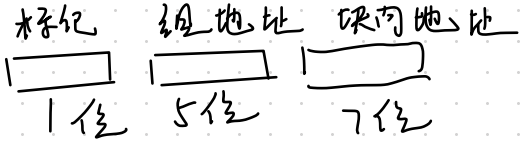
主存地址位数：$m + b = 19$

cache 地址位数：$c + b = 13$

主存：



cache：



3.

6+9+3

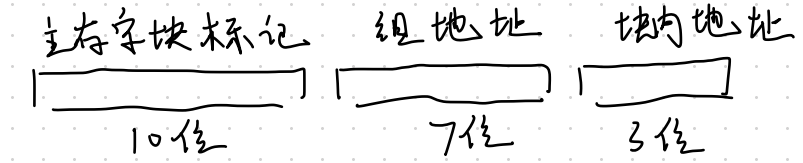
(1)

$c = \log_2 \frac{16KB}{8字} = 9$ $\quad r = \log_2 4 = 2$

$b = \log_2 8 = 3$ $\quad m = \log_2 \frac{4MB}{8字节} = 17$

$c' = 9 - 2 = 7$ $\quad t = m - c = 17 - 9 = 8$

⇒ 主存地址字段：



(2)

$$\frac{90 \times 8}{90 \times 9} = 88.9\%$$

(3) 设主存速度为 v，

$$\frac{v}{88.9\% \times \frac{1}{6}v + (1 - 88.9\%)v} = \frac{27}{7} = 3.86$$