1. $\text{speedup} \leq \frac{1}{0.05 + 0.095} = \frac{1}{0.145} = 6.897$

2. $10 \leq \frac{1}{0.06 + 0.94/p}$

$\cancel{0.6} + 9.4/p \leq \cancel{1}\ 0.4$ $\therefore P_{min} = 24$

$p \geq 23.4$

3. $50 \leq \frac{1}{x + (1-x)/p}$

$x + \frac{(1-x)}{p} \leq \frac{1}{50} = 0.02$

$p \to \infty$ $x \leq 0.02 = 2\%$

4. $9 \leq \frac{10}{10x + (1-x)}$

$90x + 9 - 9x \leq 10$

$81x \leq 1$

$x \leq \frac{1}{81} = 0.012 = 1.2\%$

5. $S = \frac{9}{242} = 0.037$

$\psi \leq 16 + (1-16)0.037$

$= 15.445$

6. $\psi \leq 40 + (1-40)0.01$

$= 39.61$

Quan Fan
qfan005@ucr.edu
862099688

7. $9 = \frac{10}{f + (1-f)/10}$

$10f + 1 - f = \frac{10}{9}$

$9f = \frac{1}{9}$

$f = \frac{1}{81}$

if $p = 100$.

$\varphi \le \frac{100}{\frac{100}{81} + (1-\frac{1}{81})}$

$\le \frac{100 \times 81}{180} = 45 < 90$

$\therefore$ No

8. $4 = 2 = \frac{1}{f + (1-f)/4}$

$4f + 1 - f = \frac{4}{2}$

$3f = 1$

$f = \frac{1}{3}$

if $p = 16$

$4 \le \frac{1}{\frac{1}{3} + (1-\frac{1}{3})/16}$

$\le \frac{16}{\frac{16}{3} + \frac{2}{3}} = \frac{16 \times 3}{18} = 2.67$

$\therefore$ time $= \frac{1000}{2.67} = 374.53$ seconds.

9. a. $M(cp)/p = c^2p^2/p = c^2p$

$\boxed{c}$ $M(c\sqrt{p})/p = c^2p/p = c^2$

$\boxed{b}$. $M(c\sqrt{p}\log p)/p = c^2 p \log^2 p/p = c^2 \log^2 p$

d. $M(cp/\log p)/p = c^2p^2/\log^2 p/p = c^2 p/\log^2 p$

(f b) a (d g)

e. $M(cp)/p = cp/p = c$

f. $M(p^c)/p = p^c/p = p^{c-1}$ $(0 < c-1 < 1)$

g $M(p^c)/p = p^c/p = p^{c-1}$ $(c-1 > 1)$

$c = e > b > f > a > d > g$

Quan Fan
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862099688

10. $\cancel{T(n,1) = O(2n^3)}$

$\cancel{T_0(n,p) = O(16n^2 \log_2 p)}$

$M(n) = 24n^2$

$24n^2 \leq 2^{30} \times 1024.$

$n \leq 214039.7$

~~we let n = 214039~~

$$\psi \leq \frac{2n^3}{2n^3/p + 16n^2 \log_2 p}$$

$$\leq \frac{np}{n + 8p\log p} \quad (n = 214039,\ p = 1024)$$

$$\leq \frac{214039 \times 1024}{214039 + 8 \times 1024 \times 10} = 740.56$$

$$256 \leq \frac{np}{n + 8p\log p}$$

$$256 \leq \frac{1024 \times n}{n + 8 \times 1024 \times 10}$$

$$256n + 2 \times 1024 \times 1024 \times 10 \leq 1024n$$

$$n \geq 27306.7 \qquad \therefore n_{min} = 27307$$

Quan Fan
qfan005@ucr.edu
862099688