

4.4 第3章

1. 1) $T_{\text{pipe}} = t_{\text{MEM}} + t_d = 2.1 \text{ ns}$

2) $T_{\text{old}} = 1 + 1.5 + 1 + 2 + 1.5 = 7 \text{ ns}$ 设一个程序中有 N 条指令

$T_{\text{old}} = N \cdot T_{\text{cycle}} = 7N \text{ (ns)}$ ($7N$) $\text{ns} = 7$

$T_{\text{new}} = (N+5-1) \cdot T_{\text{pipe}} = 2.1(N+4) \text{ ns}$

$\therefore S_{\text{all}} = \frac{T_{\text{old}}}{T_{\text{new}}} = \frac{7N}{2.1N+8.4} \xrightarrow{N \gg 4} \frac{7N}{2.1N} = \frac{T_{\text{cycle}}}{T_{\text{pipe}}} = 3.33$

3) 当流水级趋近于无限多个时, $T_{\text{pipe}} \rightarrow t_d = 0.1 \text{ ns}$

$\therefore S_{\text{max}} = 70$