

Date: 2017/03/14

Student ID:

Name:

ANS

Suppose you have a machine which executes a program consisting of 50% multiply, 20% divide, and the remaining 30% from other instructions. Your manager wants the machine to run 1.4 times faster. You can make the divide run at most 3 times faster and the multiply run at most 8 times faster. Can you meet the manager's goal by making only one improvement, and which one?

Suppose the time for executing prog. to be 100(s).

According to the problem, each part of time is

$$\begin{cases} t_m = 100 \cdot 0.5 = 50 \\ t_d = 100 \cdot 0.2 = 20 \\ t_r = 100 \cdot 0.3 = 30 \end{cases}$$

Option 1 (Divide run at most 3 times faster)

$$T'_{\text{prog}1} = 50 + 20 \times \frac{1}{3} + 30 = \frac{260}{3}$$

$$\frac{T_{\text{prog}}}{T'_{\text{prog}}} = 1.15 < 1.4 \quad (X)$$

Option 2 (Multiply run at most 8 times faster)

$$T'_{\text{prog}2} = 50 \times \frac{1}{8} + 20 + 30 = \frac{225}{4}$$

$$\frac{T_{\text{prog}}}{T'_{\text{prog}2}} = 1.77 > 1.4 \quad (V)$$