1.

	ALU	load	branch	total
cycles	1	2	4	NA
A number in millions	30	75	45	150
B number in millions	30	60	30	120
A% occurences	20	50	30	100
B% occurences	25	50	25	100
A CPI				2.4
B CPI				2.25

% Occurences

$$\begin{aligned} total_A &= ALU_A + load_A + branch_A \\ 150 &= 30 + 75 + 45 \\ 1 &= .2 + .5 + .3 \\ 100 &= 20 + 50 + 30 \end{aligned}$$

$$\begin{aligned} total_B &= ALU_B + load_B + branch_B \\ 120 &= 30 + 75 + 45 \\ 1 &= .25 + .5 + .25 \\ 100 &= 25 + 50 + 25 \end{aligned}$$

CPI

$$\text{CPI} = \text{Cycles}_{\text{ALU}}(\text{ALU\%}) + \text{Cycles}_{\text{load}}(\text{load\%}) + \text{Cycles}_{\text{branch}}(\text{branch\%})$$

$$\begin{aligned} \text{CPI}_A &= 1(.2) + 2(.5) + 4(.3) \\ &= .2 + 1 + 1.2 \\ &= 2.4 \end{aligned}$$

$$\begin{aligned} \text{CPI}_B &= 1(.25) + 2(.5) + 4(.25) \\ &= .25 + 1 + 1 \\ &= 2.25 \end{aligned}$$

Execution Time

$$\text{E.T.} = \text{CPI} * \text{Instructions} * \frac{\text{Time}}{\text{Cycle}}$$

$$\begin{aligned}
\text{E.T.}_A &= 2.4 * 150,000,000 * \frac{\text{Time}}{\text{Cycle}}_A \\
&= 360,000,000 * \frac{\text{Time}}{\text{Cycle}}_A
\end{aligned}$$

$$\begin{aligned}
\text{E.T.}_B &= 2.25 * 120,000,000 * \frac{\text{Time}}{1.2 * \text{Cycle}}_A \\
&= \frac{270,000,000}{1.2} * \frac{\text{Time}}{\text{Cycle}}_A \\
&= 225,000,000 * \frac{\text{Time}}{\text{Cycle}}_A
\end{aligned}$$

$$\text{E.T.}_B < \text{E.T.}_A$$