CSE 331 Homework 1 Solutions

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1) In order to find cost of a single chip manufacturing we should use this formula;

$$\text{Cost per die} = \frac{\text{Cost per wafer}}{\text{Dies per wafer} \times \text{Yield}}$$

From question we have;

- cost per wafer = 10.000 $ (initial value)
- dies per wafer = 120
- Yield = %80 = 0,8 (initial value)

Change in 4 years for values

Cost per Wafer = $10.000 \times (0,8)^4 = 4096$

Yield $= (0,8) \times (0,9)^4 = 0,52$

if we substitute these in the formula;

$$\text{cost per die} = \frac{4096}{120 \times 0,52} = \frac{4096}{62,98} = 65,03\ \$$$

Cost of a single chip = 65,03 $

2)

a) In order to find time of Compilers we should use this formula;

Time = Instruction count x CPI x clock cycle time

So If we calculate Clock cycles of them;

* Clock cycles of Compiler A = $(50\times2 + 10\times4 + 2\times3)\times10^6 = \boxed{146\times10^6}$
* clock cycles of Compiler B = $(80\times2 + 5\times4 + 3\times1)\times10^6 = \boxed{183\times10^6}$

So if we divide them we will get;

$$\Rightarrow \frac{\text{Compiler B}}{\text{Compiler A}} = \frac{183\times10^6}{146\times10^6} = \frac{183}{146} = 1,25$$

Thus, A compiler is better than B compiler 1,25 times.

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b) For the clock speed of processor we have to find frequency

Since A compiler is better than B our equation is;

Note = 100 ms = 100×10^{-3} s

$$\Rightarrow 100\times10^{-3} = \frac{1}{f}\,146\times10^6 = 100\times10^{-3} f = 146\times10^6 \Rightarrow f = \frac{146\times10^6}{100\times10^{-3}}$$

$$\Rightarrow f = 1,46\times10^9\ \text{Hz} = \boxed{1,46\ \text{GHz}}$$