

Homework 1

*Instructor: Robert Utterback**Due: September 4, 2017*

1. Answer the following questions given the following information about two processors:

	Processor A	Processor B
Clock Rate	1.25GHz	?
Cycle Time	?	.4 nanoseconds
CPI	3.0	2.5

- (a) What is the clock rate for processor B?
- (b) What is the cycle time for processor A?
- (c) Assuming the ISA of both processor A and B are the same, what is the CPU time of processor A?
- (d) Assume the ISA of both processor A and B are the same, what is the CPU time of processor B?
- (e) Which processor is faster, and by how much? (Give the relative performance)

2. You've written two algorithms and want to know which one to use. Algorithm A has 100 instructions, while algorithm B has 120. The mix of instructions for each algorithm, as well as the CPI for each instruction type, is given below. The clock rate of your CPU is 2 GHz.

	Algorithm A	Algorithm B
Integer Math (CPI = 1.2)	50%	25%
Conditionals (CPI = 2.5)	10%	25%
Memory Access (CPI = 3.0)	40%	50%

- (a) How long is the cycle time of the CPU?
- (b) What is the average CPI for algorithm A?
- (c) What is the average CPI for algorithm B?
- (d) Which is better?

3. A new program you wrote contains four types of instructions: 20% class A, 40% class B, 30% class C, and the remaining 10% class D. You timed the program and it's execution time is 100 seconds.
- (a) What would the execution time be if you could improve class D instructions by a factor of 10?

(b) What about improving class B by a factor of 2?

4. Problem 1.15 from the text.