Homework 1
Chapter 1

Homework Instructions

1) Download the homework

2) Print the homework

3) Complete the homework

4) Scan the homework

5) Submit the homework via Canvas

Guideline Requirements

- Write your name at the top of each page

- Completed homework must be .pdf or .jpg files

- Submit homework by due date

- Homework is due Sunday and reviewed the following Class Session

- Once homework review has started, homework is NOT accepted

- SHOW ALL WORK

- Showing only answers will result in PARTIAL credit

- Show all number's unit labels if applicable (example: 100 ns not 100)

- Show all number's base if applicable (example: 101_2 not 101)

CS 170   Name:_____

Homework 1
Chapter 1

Q1. Answer the questions below given the following details for two processors.   **(40 points)**

	Processor A	**Processor B**
Clock Rate	**5 GHz**	**?**
Cycle Time	**?**	**0.25 nanoseconds**
CPI	**2.5**	**4.0**

a) What is the Clock rate for Processor B?   (8 points)

b) What is the cycle time for Processor A?   (8 points)

c) The ISA of both Processor A and B are the same, what is the CPU time of Processor A? (In terms of IC)   (8 points)

d) The ISA of both Processor A and B are the same, what is the CPU time of Processor B? (In terms of IC)   (8 points)

e) Which Processor is faster, and by how much? (Give the relative performance)   (8 points)

Homework 1
Chapter 1

Q2. Consider the following problem: **(40 points)**

A programmer has written two algorithms and wants to know which is better. The CPI for each of the instructions types are given as well as the percentage of instructions for each algorithm. The CPU clock rate is 4.0 GHz. Algorithm A results in 200 instructions, Algorithm B results in 400 instructions.

	Algorithm A	Algorithm B
Integer Math (CPI = 2.0)	40%	30%
Conditionals (CPI = 1.0)	20%	10%
Memory Access (CPI = 3.0)	40%	60%

a) How long is the cycle time of the CPU?   (8 points)

b) What is the Average CPI for Algorithm A?   (8 points)

c) What is the Average CPI for Algorithm B?   (8 points)

d) Which is better?   (16 points)

Homework 1
Chapter 1

Q3. Consider the following: **(20 points)**

There are four main components to the hardware. Memory accesses account for 30% of all instructions, integer

arithmetic accounts for 20% of all instructions, conditionals account for 25% of all instructions, and jumps account for

the rest. Assume the original execution time takes 400 seconds.

a)   Assuming jumps can be improved by a factor of 4, what is the new execution time?   (10 points)

b)   Assuming integer arithmetic can be improved by a factor of 2, what is the new execution time?   (10 points)