

# EE3450 Hw1 - Question 5

總分 18/18 ?

Chapter 1 Computer Abstraction and Technology

0分, 共0分

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Question 5 (1.11)

18分, 共18分

[1.9] means you should have read Section 1.9, Under the Covers, to help you solve this exercise.

The results of the SPEC CPU2006 bzip2 benchmark running on an AMD Barcelona has an instruction count of  $2.389E+12$ , an execution time of 750 s, and a reference time of 9650 s.

✓ 1. [1.6, 1.9] Find the CPI if the clock cycle time is 0.25 ns. (Round off to the 2/2 2nd decimal place) \*

1.26



✓ 2. [1.9] Find the SPEC ratio. (Round off to the 2nd decimal place) \* 2/2

12.87



✓ 3. [1.6, 1.9] Find the increase in CPU time if the number of instructions of the benchmark is increased by 10% without affecting the CPI. (Answer in percentage and round off to the 2nd decimal place. For example, if your answer is 5.456%, the answer you fill will be "5.46") \*

10



✓ 4. [1.6, 1.9] Find the increase in CPU time if the number of instructions of the benchmark is decreased by 15% and the CPI is increased by 30%. (Answer in percentage and round off to the 2nd decimal place. For example, if your answer is 5.456%, the answer you fill will be "5.46") \*

10.5



✓ 5. [1.6] Suppose that we are developing a new version of the AMD Barcelona processor with a 4 GHz clock rate. We have added some additional instructions to the instruction set in such a way that the number of instructions has been reduced by 15%. The execution time is reduced to 700 s. Find the new CPI. (Round down to the 2nd decimal place) \* 2/2

1.37



✓ 6. [1.6] By how much has the CPU time been reduced? (Answer in percentage and round off to the 1st decimal place. For example, if your answer is 5.456%, the answer you fill will be "5.5") \* 2/2

6.7



✓ 7. [1.6] For a second benchmark, libquantum, assume an execution time of 960 ns, CPI of 1.61, and clock rate of 3 GHz. If the execution time is reduced by an additional 10% without affecting to the CPI and with a clock rate of 4 GHz, determine the number of instructions. (Round up to the nearest integer. For example, if the result is 2399.6, the answer will be 2400) \* 2/2

2147



✓ 8. [1.6] (From above question) Determine the clock rate (GHz) required to achieve 10% reduction in CPU time while maintaining the number of instructions and with the CPI unchanged. (Round off to the 2nd decimal place) \* 2/2

3.33



✓ 9. [1.6] (From above question) Determine the clock rate (GHz) if the CPI is reduced by 15% and the CPU time by 20% while the number of instructions is unchanged. (Round off to the 2nd decimal place) \* 2/2

3.19

