

Score: _____ Name: _____

1. (5 points) AMD's Athlon chips are labeled with the equivalent Intel chip clock frequency to indicate the relative performance for marketing purposes. AMD was worried that a lower frequency clock on the AMD chip would hurt sales. The AMD Athlon 3000 (program execution time performance equivalent to a 3Ghz Intel chip) actually has a 2167Mhz clock.

Execution Time_{AMD} = Execution Time_{Intel}
Instructions the same

$$CPI_{AMD} \times \text{Clock Rate}_{AMD} = CPI_{Intel} \times \text{Clock Rate}_{Intel}$$
$$CPI_{AMD}/CPI_{Intel} = \frac{2167}{3000} = .722$$

Assuming this claim is accurate, the ratio CPI_{AMD}/CPI_{Intel} is .722 (accurate to three decimal places)

2. (5 points) A computer hardware designer is considering adding a hardware multiplier to a small processor. The hardware improvement to the multiplier makes the multiply operation 32 times faster.

$$6 + \frac{4}{32} = 6.125 \text{ ms}$$

A DSP application that runs in 10 ms (ms is 10^{-3} sec) spends 40% of its execution time performing multiply operations. With the hardware multiplier, the DSP application

would run in 6.125 ms. (accurate to 3 decimal places)

$$7.68 + \frac{.32}{32} = 7.69$$

$$40\% \text{ of } 8 \text{ is } .32$$

A communication task that also runs on the processor takes 8 ms. It only spends 4% of its execution time performing multiplies. With the hardware multiplier, the

communication task would run in 7.69 ms. (accurate to 3 decimal places)