

# CMPUT 229 - Computer Organization And Architecture I

## Quiz #2 — Winter 2014

### CMPUT 229 Honor Code Solution

By turning in the quiz solution for grading, I certify that I have produced the solution in accordance to the academic integrity policies in Section 26.1 of the University of Alberta 2013/2014 Calendar.

#### Question 1 (10 points):

The table below shows the amount of time (in seconds) spent in different classes of instructions when a given program executes in a machine. A change to the compiler leads to a program that executes fewer floating point (FP) instructions and does not affect the time of any of the other classes of instructions. This compiler improvement leads to a 6% improvement in the total execution time of this program.

What is the reduction, expressed as a percentage, in the time spent in FP instructions?

FP Instructions	INT Instructions	Load/Store Instructions	Branch Instructions
60s	90s	70s	30s

$$\text{Original Total Time} = 60s + 90s + 70s + 30s = 250s$$

$$\text{Improved Total Time} = (1 - 0.06) \times 250s = 235s$$

$$\text{Time Improvement} = 250s - 235s = 15s$$

$$\text{Improved FP Time} = 60s - 15s = 45s$$

$$\% \text{ Improvement} = \frac{60s - 45s}{60s} = \boxed{25\%}$$

By how much should the time spent in FP instruction be reduced to achieve a total time reduction of 24%?

Since our FP instructions take up 24% of the total time, we would have to spend 0s on them to achieve the reduction.