**Comp 4300 Homework 1**

**Has0027**

**1.)** For this we can use Amdahl’s law:

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Where speedupoverall = 2, frac = 0.75, and speedupenhanced is our unknown.

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So, by solving for speedupenhanced we see that the loads and stores were sped up by a **factor of** **2**

**2.)** If loads and stores took no time at all then the speedupenhanced would be infinity meaning we would be left with:

Speedupoverall = 1 / (1 – 0.75) = **4**

**3.)** The equation to find MTTF = Total hours of operation ÷ Total assets in use

* MTTF = 365 / 3 (since each has an MTTF of 1 year)
* **MTTF = 121.67**

**4.) a.** The average CPI can be calculated with: CPIavg = ∑ fraci \* CPIi (for i within instr)

* 1(20/100) + 5(40/100) + 3(20/100) + 2(20/100) = 3.2

So, the average CPI for this particular computer = **3.2**

**b.** To get the speedup due to this optimization we can use the formula:

speedup = (old average CPI) / (new average CPI)

First, we must calculate the new CPI for load/store:

* 2 + (10% \* 2) = 2.2

Now we can calculate the new average CPI using the formula in part a:

* 1(20/100) + 2.2(40/100) + 3(20/100) + 2(20/100) = 2.08

So, the speedup from this optimization will be 3.2 / 2.08 = **1.538**