**CSCI 311 Homework 1**

1. Given three different machines m1, m2 and m3. M1 has a 4 GHz clock and an average CPI of 2.2, M2 has a 3 GHz clock and an average CPI of 1.5, and M3 has a 2.5 GHz clock and a CPI of 1
   1. Which processor executes the most instructions per second?
   2. If each processor runs for 10 seconds, how many cycles and how many instructions are performed?
2. Give the MIPS code for ARR[7]=A2[i-j]; where ARR’s start address is in $s1, A2’s start address is in $s2, i is in $t3 and j is in $t6.
3. With multi-core computers, more than one instruction can be executed per cycle. So another measure could be Instructions per Cycle (verses cycles per instruction). Given the following two machines and their attributes, find the IPC for each machine.

|  |  |  |  |
| --- | --- | --- | --- |
| Machine | Clock rate | Instruction executed | Time (sec) |
| P1 | 2 GHz | 20 \* 109 | 7 |
| P2 | 1.5 GHz | 30\*109 | 10 |

1. Given the following breakdown for two different programs, executing on a machine that takes 1 cycle for a compute instruction, 10 cycles for a load or store, and 3 cycles for a branch, determine how much time it will take to run on a 3 GHz processor.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Program | Compute | Load | Store | Branch | Total |
| P1 | 1000 | 400 | 100 | 50 | 1550 |
| P2 | 1500 | 300 | 100 | 100 | 1750 |