Homework 1 [10% of the final grade]
CS 465 (Fall 2010)
Instructor: Huzefa Rangwala
Due Date: 09.29.2010
No Late submissions Accepted.
Total Points Possible: **100**
No Teamwork allowed for this assignment.

Part 1: Problems and Questions from the textbook: [50 points/10 points each]

1. **Exercise 1.5.1, 1.5.2, 1.5.3 and 1.5.4 [Only Part a)]**

   [There are two sets of parts for every sub-problem (just do part a)]

2. **Exercise 1.6.4, 1.6.5, and 1.6.6 [Only Part a)]**

   [There are two sets of parts for every sub-problem (just do part a)]]

3. **Exercise 1.12**

4. **Exercise 2.2**

5. **Exercise 2.6**

Part 2: MIPS Programming Simulation. [50 points]

The goal of this exercise is to execute a MIPS Assembly program on a SPIM simulator.

a) Before beginning this exercise you should read appendix section B.9 and the pdf's for spim/xspim and PCspim provided to you in HW0.

b) Now download the SPIM program (sort.s)

c) Load the program in your favored spim simulator.

d) Step through the program and note how the contents of the PC change after each step (the contents of registers also change depending on what the instruction does). Give examples of the first register change you see and report it as part of this exercise.

e) When do you think the contents of memory change?
(HINT: step through your program until you come to a sw instruction. Examine the contents of memory before and after executing that instruction). Report this as part of this exercise.

f) Also, step through the program until you come to (i) any branch instruction (ii) a jalinstruction. Note how the PC (and $31) in the case of jal change after SPIM executes the instruction. Report it as part of this exercise.

g) How often is the following instruction on line 18 executed

addi $t1,$t1,-1

(HINT: You should print out a listing of your program, and examine what is happening in the program. You can come up with a count of how often each instruction is executed based on analysis, not using SPIM.) Report it as part of this exercise and your reasoning.