# CSCI 2321 (Principles of Computer Design), Spring 2004
# Homework 6

**Assigned:** April 7, 2004.

**Due:** April 14, 2004, at 5pm.

**Credit:** 20 points.

## 1  Problems

Do the following problems. You may write out your answers by hand or using a word processor or other program, but please submit hard copy, either in class or in my mailbox in the department office.

1. (10 points)  Suppose that at the beginning of a clock cycle the following is true:

   - The program counter (PC) has a value of 4.
   - Memory location 4 contains the binary representation of the MIPS assembler instruction `add $t0, $t1, $t2`.
   - Register `$t1` contains 8.
   - Register `$t2` contains -2.

   Trace through what happens during execution of this instruction by the multicycle implementation described in section 5.4:

   - How many cycles are required for execution of this instruction?
   - For each cycle, what are the values of the control signals in the table of Figure 5.34 (p. 384)? You may omit any whose values don't matter.
   - For each cycle, which state elements' values change at the end of the cycle, and to what? State elements include the register file, the memory, and the PC, IR, MDR, A, B, and ALUOut registers.

2. (10 points)  Suppose that at the beginning of a clock cycle the following is true:

   - The program counter (PC) has a value of 8.
   - Memory location 8 contains the binary representation of the MIPS assembler instruction `lw $t0, 8($t1)`.
   - Register `$t1` contains 16.
   - The 32-bit value stored starting at memory location 24 is -10.

   Trace through what happens during execution of this instruction by the multicycle implementation described in section 5.4, as in the preceding problem.