22C:160 High Performance Computer Architecture
Homework 1

Assigned January 26, 06
Due Feb 2, 06
Total Points = 50
There are five questions. Each question is worth 10 points.

Question 1. Write an assembly language program for MIPS corresponding to the following statement:

(a) if g > h **then** k:= g **else** k:= h

Assume that the variables g, h, k have been assigned the memory addresses 32, 36, 40 respectively.

(b) $y = 2^x$ Assume that x is stored in register t0 and y will be saved in register s0. Do not use any instruction other than add, sub, addi, subi, beq (or bne), and j

Question 2. Write down the **machine language** (i.e. binary) versions of the following MIPS instructions:

(a) lw $t3, 36($s1)
(b) sub $t1, $s2, $s5
(c) beq $s1, $s2, 256 (assume that the current value of the PC = 200)
(d) sw $s2, 16($s1)

(Hint: Use table 2.27 in page 105)

Question 3. Write one or more MIPS assembly language instructions to

(a) Store a constant 8 into a register $t0.
(b) Copy the content of a register $s4 into another register $t0
(c) Multiply the content of a register $t0 by a constant 5. (Don't use the Multiply instruction for this part)
(d) Load a word, whose **memory address** is the sum of two registers $s1, $s2, into $t0.

Question 4. Translate the following binaries into the assembly language instructions of MIPS:

(a) 00000001 00000000 10100000 00100010
(b) 00100001 00110000 00000000 11111111

(Use Fig 2.25 in page 103. The materials in the preceding few pages may be helpful.)

Question 5. Solve problem 2.29. (the fourth instruction is not quite right – the `sub' should be `subi'. Then state in one sentence what this program computes.