16.482 / 16.561: Computer Architecture and Design
Summer 2015

Homework #1
Due **Friday, 5/22/15**

Notes:
- While typed submissions are preferred, handwritten submissions are acceptable.
- Any electronic submission must be in a single file. Archive files will not be accepted.
- This assignment is worth a total of 50 points.

For each instruction sequence below, assume the following initial state. Note that your answers to each part should use the values below—your answer to part (2), for example, should not affect your answer to part (1). However, please note that each part is a sequence of instructions—the result of the sub in part (1) will affect the add in part (1).

- $s0 = 0x16482000, $t0 = 0x0000000C, $t1 = 0x00000003
- Contents of memory (all values are in hexadecimal)

Address	Lo			Hi
0x16482000	AA	BB	11	22
0x16482004	33	44	09	FF

Please note that in the (corrected) figure above, "Lo" refers to the lowest address offset within the line (i.e., 0), while "Hi" refers to the highest offset (i.e., 3). In other words, the byte at address 0x16482000 is 0xAA, while the byte at address 0x16482003 is 0x22.

For each sequence of instructions below, list **all** changed registers or memory locations and their new values. When listing memory values, list the entire word—for example, if a byte is written to 0x00100000, show the values at addresses 0x00100000-0x00100003.

1. (8 points)
    ```
    sub    $t3, $t0, $t1
    addi   $t4, $t0, 8
    add    $t5, $t3, $t4
    ```

2. (12 points)
    ```
    addi  $s1, $zero, 0xFFFF
    xor   $s2, $t0, $s1
    srl   $s3, $s2, 4
    and   $s4, $s3, $s2
    ```

3. (18 points)
    ```
    lh     $t2, 0($s0)
    lhu    $t3, 6($s0)
    sra    $t4, $t2, 8
    sb     $t3, 3($s0)
    sw     $t4, 4($s0)
    ```

4. (12 points)
    ```
    slti    $s0, $t1, 11
    bne     $s0, $zero, L
    or      $t0, $t0, $t1
    L: sh   $t0, 2($s0)
    ```

    Note: In your solution, clearly indicate if the branch is taken. Also, note that the immediate value "11" is a decimal value, not hexadecimal.