

16.482 / 16.561: Computer Architecture and Design

Summer 2014

Homework #1

Due **Friday, 5/23/14**

Notes:

- While typed submissions are preferred, handwritten submissions are acceptable.
- Any electronic submission must be in a single file. Do not scan individual pages and attach each page; copy and paste the images into a single document. If multiple files are strictly necessary, combine all files into a .zip archive—please do not use .rar format.
- 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 add in part (1) will affect the sub in part (1).

- $\$s0 = 0x00100000$, $\$t0 = 0x00000006$, $\$t1 = 0x00000007$
- Contents of memory (all values are in hexadecimal)

Address

0x00100000	0C	15	27	30
0x00100004	FF	27	DD	CC

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)

```
add    $t2, $t0, $t1
addi   $t3, $t1, -6
sub    $t4, $t2, $t3
```

2. (12 points)

```
and    $s1, $t0, $t1
ori    $s2, $s1, 0xFFF0
sll    $s3, $s2, 16
sra    $s4, $s3, 16
```

3. (18 points)

```
lui    $s1, 0x0010
or     $s1, $s1, $t0
lh     $t6, 0($s1)
lhu    $t7, 0($s1)
srl    $t8, $t6, 8
sb     $t8, -4($s1)
```

4. (12 points)

```
slt    $s0, $t1, $t0
beq    $s0, $zero, L
add    $t0, $t0, $t1
L: add $t3, $t0, $t0
```

Note: In your solution, clearly indicate if the branch is taken.