

# IC220: HW 3

Due: 1 Feb 2019

**Full Name:** \_\_\_\_\_ **Alpha:** \_\_\_\_\_

**Circle Your Section:** Aviv/1001 Aviv/2001 Aviv/4001 Choi/5001 Missler/5002

**Preliminary:** Carefully do the assigned reading for Chapter 2 (2.1-2.3,2.5-2.10,2.12)

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1. The MIPS code below processes two arrays and produces an important value in register \$v0. Assume that each array consists of 2500 4-byte words indexed 0 through 2499, that the base address of these arrays are stored in \$a9 and \$a1 (respectively), and their sizes (2500) are stored in \$a2 and \$a3 (respectively).

(a) **[10 points]** Add comments to the code that describe each instruction

```
        sll    $a2, $a2, 2
        sll    $a3, $a3, 2
        add    $v0, $zero, $zero
        add    $t0, $zero, $zero
outer:   add    $t4, $a0, $t0
        lw     $t4, 0($t4)
        add    $t1, $zero, $zero
innner:  add    $t3, $a1, $t1
        lw     $t3, 0($t3)
        bne    $t3, $t4, skip
        addi   $v0, $v0, 1
skip:    addi   $t1, $t1, 4
        bne    $t0, $a2, outer
        addi   $t0, $t0, 4
        bne    $t0, $a2, outer
```

- (b) [10 points] Suppose you run the code with Array 1 and Array 2 like below

Array 1		Array 2
13		13
7		24
7		19
20		20
42		7
51		51
100		7
33		7

What is the output in \$v0?

Show your work below for full credit?

2. [5 points] Given the function `function1(int a, int b)`, write the mips code that would **call** the function like `function1(3, 7)` then store the result/return-value in `$s0`

3. [5 points] You have this definition for a function:

```
int function1(int a, int b){ return (a-b); }
```

Write MIPS code to **define** the function:

4. [5 points] Write MIPS code to **define** the following function

```
int min(int a, int b){  
    if ( a < b )  
        return a;  
    else  
        return b;  
}
```

5. [10 points] Write the MIPS code to **define** the following function:

```
int function2( int g, int h){  
    return h + function1(13,g,h);  
}
```

*You will need to store something on the stack — describe why/where in comments!*

6. [10 points] Write the MIPS code to **define** the following function:

```
int function3( int g, int h){  
    return function6(a+10,b) + function7(b);  
}
```

*You will need to store something on the stack — describe why/where in comments!*

7. [10 points] Write the MIPS code to **define** the following function:

```
int lemur( int a, int b){  
    return pand(a + 100) + b;  
}
```

*You will need to store something on the stack — describe why/where in comments!*

8. [15 points] Write the MIPS code to **define** the following function:

```
int alpaca( int x, int y, int z){  
    return hedgehog(ferret(y,z) + x);  
}
```

*You will need to store something on the stack — describe why/where in comments!*