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 `$v0`. Assume that each array consists of 2500 4-byte words indexed 0 through 2499, that the base address of these arrays are stored in `$a0` 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  $t1, $a3, inner
            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 funtion:

```
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 a, int b){
  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!