IC220: HW 1

Due: 16 Jan 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 1 (1.1-1.5, 1.7-1.8)

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1. **[10 points]** Exercises 1.1 from the book (see end of chapter). Place your answer below (list and briefly describe)

   1.

   2.

   3.

   4.

2. **[3 points]** Exercise 1.2 from book

   (a)

   (b)

   (*Hint: think about what these cables are made of*)

   (c) Performance via prediction

   (d)

   (e) Hierarchy of Memories

   (f)

   (g)

   (h)

3. [**5 points**] What is the MIPS assembly code for the following:

   ```
   g = g + h - i
   ```

   Variable `g`, `h`, and `i` are assigned registers `$s1`, `$s2`, and `$s3`.

4. [**10 points**] Assume variables `a`, `b` and `c` are assigned registers `$s1`, `$s2`, and `$s3`, and the address of array `A` is in `$s5`. Write the MIPS code for the following:

   ```
   b = a + c + A[4] - A[5]
   ```

5. [**10 points**] Assume variables `a`, `b` and `c` are assigned registers `$s1`, `$s2`, and `$s3`, and the address of array `A` is in `$s5`. Write the MIPS code for the following:

   ```
   b = A[2*c]
   ```

6. [**4 points**] Convert the following **hexadecimal** numbers to **decimal**: *Hexadecimal and binary will be very important in this class! Be sure you understand the following. Do the work by hand!*
   (a) `0xb5` (*note that the leading* `0x` *indicated the following is in hexadecimal*)

   (b) `0x81` (*note that the leading* `0x` *indicated the following is in hexadecimal*)

7. [**4 points**] Convert the following **hexadecimal** numbers to **binary**: *Hexadecimal and binary will be very important in this class! Be sure you understand the following. Do the work by hand!*
   (a) `0x3d` (*note that the leading* `0x` *indicated the following is in hexadecimal*)

   (b) `42` (*note that this number is base 10!*)

8. [**6 points**] For the following hexadecimal number `0x7ffffffa`
   (a) What binary number does this number represent?

   (b) What decimal number does it represent?

9. [**10 points**] Show the hexadecimal representation of these MIPS instructions

```
add $t0, $t1, $zero
```

10. [**10 points**] What MIPS instruction is represented by this binary entry. *Hint: start by figuring out what the opcode is and then the instruction type.*

```
1000 1101 0000 1001 0000 0000 0100 0100
```

11. [**5 points**] What is the MIPS assembly code for the following:

```
if (g != j){ h = g -h; }
else { h = g + h; }
```

Using the following variable to register assignments

```
f : $s0
g : $s1
h : $s2
i : $s3
j : $s4
```

12. [**5 points**] What is the MIPS assembly code for the following:

```
if ( j == h){ g = i + j;}
```

Using the following variable to register assignments

```
f : $s0
g : $s1
h : $s2
i : $s3
j : $s4
```

13. [**5 points**] What is the MIPS assembly code for the following:

```
if ( (j == h) && (f != i) ){ g = i + j;}
```

Using the following variable to register assignments

```
f : $s0
g : $s1
h : $s2
i : $s3
j : $s4
```

14. [**10 points**] What is the MIPS assembly code for the following:

```
if ( (g != h) && (f == i) ) || (g == i) ){ g = i + j;}
```

Using the following variable to register assignments

```
f : $s0
g : $s1
h : $s2
i : $s3
j : $s4
```