COMPUTER ARCHITECTURE & ASSEMBLY LANGUAGE
14:332:331
Rutgers University
Fall 2016

Homework 2
Due: 10/7/2016

1. Consider the following MIPS loop:

```
LOOP: slt $t2, $0, $t1
      beq $t2, $0, DONE
      addi $t1, $t1, -1
      addi $s2, $s2, 2
      j LOOP
DONE:
```

   a) Assume that the register $t1 is initialized to the value 10. What is the final value in register $s2 assuming $s2 is initially zero?
   b) For the above loop, write the equivalent C code routine. Assume that the registers $s1, $s2, $t1, and $t2 hold the integer variables A, B, i, and j, respectively.
   c) For the loop written in MIPS assembly above, assume that the register $t1 is initialized to the value N. How many MIPS instructions are executed? (first assume that N is 10 for your calculations and then generalize).

2.

   a) Suppose that the current value of PC is 0x00004000. Can we use a single jump instruction to go to PC= 0x20014924?(if yes, write the jump instruction and show the value of the immediate field in Hex. If not, use a combinations of instructions to do so and show the immediate values in Hex)

   b) Suppose that the current value of PC is 0x00004000. Can we use a single branch instruction to go to PC= 0x20014924?(if yes, write the branch instruction and show the value of the immediate field in Hex. If not, use a combinations of instructions to do so and show the immediate values in Hex)

   c) Suppose that the current value of PC is 0x1FFFF000. Can we use a single branch instruction to go to PC= 0x20014924 (if yes, write the branch instruction and show the value of the immediate field in Hex. If not, use a combinations of instructions to do so and show the immediate values in Hex)

3. Compile the following C code to MIPS.

```
int func (int a, int b, int c){
if (a<=c)
   return 4;
else if (a<b)
   return 8
else
   return a+c
```

```
}
```

4. Compile the assembly code for the following C code.

```
int f1 (int m, int n){
        return f2(4*n+m);
}
```

5. Compile the assembly code for the following C code.

```
int f3 (int n){
   if (n>20)
      return 0;
   else if (n<=1)
       return 1;
   else return (4*f3(n-2)+2)
 }
```