ECE M116C - CS M151B Computer Architecture Systems - UCLA

Homework 1

Deadline: Thursday, Oct. 10, 11:55 PM

Fall 2024

(Upload it to Gradescope.)

Q1. What is the machine code for the following instructions:

```
SUB x17, x16, x0
XORI x8, x1, -8
SB x4, x3, -4
LUI x0, 0x10
```

Q2. What is the machine code for the following JAL instruction:

```
X100 jal x0, Loop
     …
X20C Loop:
     …
```

Q3. What is the machine code for the following JALR instruction:

```
X100 jalr x0, x1, 64
     …
X20C Loop:
```

(what was the difference in how we calculated the offset for JAL and JALR in Q2 and Q3?)

Q4. What is the assembly instruction for each of the following machine codes:

a) `0xff908893`

b) `0xfe215ce3`

Q5. Write a RISC-V assembly language program to determine whether a number is both even and divisible by 3.

Use the following information in writing your assembly code.

1. The function starts at memory location `0x200`. Each instruction is 32 bits, thus the second instruction should begin with `0x204`, and so on. Use this

information to correctly compute the offset for jump and branch instructions (you are not allowed to use labels).
2. The input is passed (stored) in register `a0`.
3. The return value should be stored in `a0`.
4. The return address is stored in `ra`.
5. You are free to use saved and temporary registers (don't forget to save values if you are using saved registers).
6. You are allowed to use Pseudoinstructions (e.g., `ret`, `call`, etc.).