CDA 3103 Computer Organization Homework

**For the whole assignment, pseudo-instructions are not allowed except “j target\_label”.**

**Section I: Problems**

1. (10 points) The **NOR** instruction is not part of the RISC-V instruction set because the same functionality can be implemented using existing instructions. Write a short assembly code snippet that has the following functionality: **t2 = t0 NOR t1**. Use as few instructions as possible.
2. (20 Points) Write RISC-V assembly code for placing the following immediate constants in register **s7**. Use a minimum number of instructions.
   1. 58
   2. -109
   3. 0xDDCB928A
   4. 0xA1236BDF
3. (40 Points) Convert the following high-level code into RISC-V assembly language. Assume that the signed integer variables **g** and **h** are in registers **t0** and **t1**, respectively. You can use other temporary registers like **t2** and **t3** if needed.

**if (g > h)**

**g = (g - 6) \* 3.5;**

**else**

**h = (h + 7)/16;**

**if (g <= h)**

**g = (2.5 \*h - g) % 32;**

**else**

**g = (g + 3 \* h) \* 14;**

1. (30 points) Comment on each snippet with what the snippet does. Assume that there is an array, **int arr [6] = {3, 1, 4, 1, 5, 9}**, which starts at memory address **0xBFFFFF00**. You may assume that each integer is stored in 4 bytes. Register **a0** contains **arr**'s address **0xBFFFFF00.**
   1. **(10 points)**

**lw t0, 0(a0)**

**lw t1, 8(a0)**

**add t2, t0, t1**

**sw t2, 4(a0)**

* 1. **(20 points)**

**add t0, x0, x0**

**loop: slti t1, t0, 6**

**beq t1, x0, end**

**slli t2, t0, 2**

**add t3, a0, t2**

**lw t4, 0(t3)**

**sub t4, x0, t4**

**sw t4, 0(t3)**

**addi t0, t0, 1**

**j loop**

**end:**

Section II: Submission Requirements

The following requirements are for electronic submission via Canvas.

* Your solutions must be in a single file with a file name yourname-module4-assignment-1.
* Upload the file by following the link where you download the homework description on Canvas.
* If scanned from hand-written copies, then the writing must be legible, or loss of credits may occur.
* Only submissions via the link on Canvas where this description is downloaded are graded. Submissions to any other locations on Canvas will be ignored.