Due Date: Wednesday, April 5, 2023   **Sample Solution**

Submission: electronically on eTL (scan & upload)

Question 1
Instruction Encoding

An important C source code file went missing; we only have the header file left.

```
int foo(int a, int b, int c);

                                        important.h
```

You manage to find and disassemble a binary of the file which was compiled for the RV32I architecture.

```
        .text
        .align      2
        .globl      foo
        .type foo, @function
foo:
    mul   a4,a1,a2
    mv    a3,a0
    li    a5,2
    sub   a5,a5,a2
    sll   a0,a1,a5
    mul   a2,a2,a3
    add   a4,a4,a3
    add   a4,a4,a0
    ble   a2,a4,.L1
    mv    a0,a1
.L1:
    ret
                                        important.o
```

Reconstruct the original C code from the RISC-V object code. The arguments to the function are passed in registers a0 to a2, i.e., a is in a0, b in a1, and c in a2. The result of foo is returned in register a0.

```c
int foo(int a, int b, int c)
{

    int t1 = a + b*c;

    int t2 = b << 2 - c;

    int t3 = t1 + t2;

    if (a*c > t3) return b;

    else return t2;

}
```

important.c