Homework Assignment 2

Collaboration Policy. Homework will be done individually: each student must hand in their own answers. It is acceptable for students to collaborate in understanding the material but not in solving the problems or programming. Use of the Internet is allowed, but should not include searching for existing solutions.

Under absolutely no circumstances can code be exchanged between students. If some code was shown in class, it can be used, but it must be obtained from Canvas, the instructor, or the Course Assistant.

Assignments from previous offerings of the course must not be re-used. Violations will be penalized.

Late Policy. No late submissions will be allowed without consent from the instructor. If urgent or unusual circumstances prohibit you from submitting a homework assignment in time, please e-mail me; otherwise the late penalty provided in the Syllabus applies.

Deliverable. A single professionally typed pdf or MS Word file on Canvas. **Show your work in detail**, do not just provide a brief answer. No handwritten work or pictures of handwritten work are accepted.

Problem 1 (20 points) Convert the following code into LEGv8. Assume g and h are in registers X19, and X20 respectively:

```
if (g < h)
        g=g+ h;
else
  h = h * 2
```

Problem 2 (20 points) Consider the following high level code. Assume the array temp is initialized before it is used, and that register X20 holds the base address of temp. Convert the code to LEGv8.

```
for (i =0; i<100; i = I +1)
temp[i] = temp[i] +1
```

Problem 3 (15 points) Consider the high level code:

```
int f, g, y //global 64-bit variables

int sum (int a, int b) {  // at memory address X0+1000.
                return (a +b)
}
```

```
int main (void)    // at memory address X0 + 800
{
  f=2;
  g=3;
  y= sum (f, g);
  return y;
}
```

Convert this code to LEGv8, making valid assumptions about registers and register use. Note that brackets and global variable declarations are not affecting the addresses of the instructions in memory.

Problem 4 (15 points) Provide the instruction type, assembly language instruction, and binary representation of instruction described by the following LEGv8 fields:

Op=0X7c2 Rn=11 Rt=4, const=0x4

Problem 5 (15 points) For the following C statement, write a minimal sequence of LEGv8 assembly instructions that performs the identical operation. Assume value of B is stored in register X9, and the base address of the array C is in X11:

B = C[2] << 4;

Problem 6 (15 points) Translate the following LEGv8 code into C. Assume the C-level integer I is held in register X10, X0 holds the C-level integer called result, and X1 holds the base address of the integer MemArray.

```
        ORR   X10, XZR, XZR
LOOP:  LDUR   X11, {X1, #0]
        ADD   X0, X0, X11
        ADDI  X1, X1, #8
        ADDI  X10, X10, #1
        CMPI  X10, 100
        B.LT  LOOP
```