Computer Science 304
Computer Organization
Spring 2025
Assignment 10

Due: beginning of class, Tuesday, 4/22/2025

Answer the following questions and submit solutions at the beginning of class on the due date. Show your work for full credit. All submissions must be completely your own work.

1. [14 points] Fill in the blanks of the following C code, given the equivalent Y86 assembly code:

```
long test (long x, long y, long z) {
   long val = ____(a)____;

   if (____(b)____) {
      if (____(c)____)
         val = ____(d)____;
      else
         val = ____(e)____;
   }
   else if (____(f)____)
      val = ____(g)____;

   return val;
}
```

```
# assume x in %edi, y in %esi, and z in %edx
.pos 0x100
test:   rrmovl %edi, %eax
        irmovl $1,   %ebx
        subl   %ebx, %eax
        rrmovl %edi, %ebx
        addl   %edx, %ebx
        subl   %esi, %ebx
        jge    L1
        irmovl $2,   %ebx
        subl   %edx, %ebx
        jg     L2
        rrmovl %esi, %ebx
        addl   %esi, %ebx
        addl   %ebx, %eax
        jmp L4

L2:     subl   %edi, %eax
        jmp L4

L1:     rrmovl %esi, %ebx
        addl   %edx, %ebx
        subl   %edi, %ebx
        jge    L4
        addl   %edx, %eax

L4:     ret
```

2. [18 points] Translate the Y86 code in problem 1 to byte code. Show each memory address location beside the corresponding byte sequence.

3. [18 points] Decode the following byte sequences into Y86 32-bit instructions. Hint: Repeated memory addresses indicate assembler directives and labels. The first **`0x000`** address indicates a **`.pos`** directive; the other addresses are labels. Use labels **`L1`** and **`L2`** for those locations.

```
0x000:
0x000: 30f000000000
0x006: 30f101000000

0x00c:
0x00c: 30f701000000
0x012: 6217
0x014: 741b000000
0x019: 6010

0x01b:
0x01b: 30f201000000
0x021: 6021
0x023: 30f264000000
0x029: 6112
0x02b: 750c000000

0x030: 00
```

What does this program do?