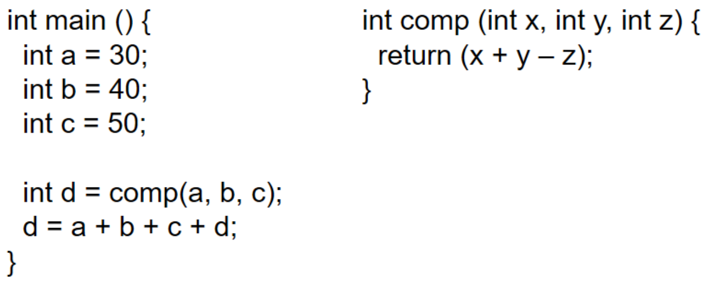
Homework Assignment 3

(Due 2:00pm, Oct. 26, email to daehyun.kim@wsu.edu)

1. (20 points) Make an assembly source code for the following C code. You will have to use the subroutine-call-related instructions (BL and BX).



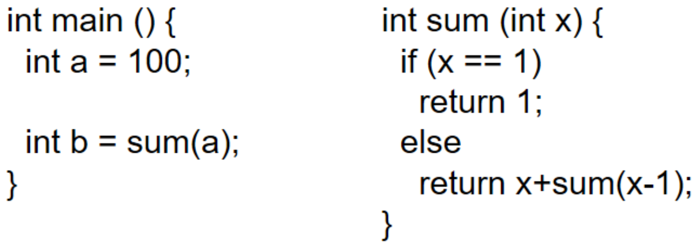
```
int main () {
  int a = 30;
  int b = 40;
  int c = 50;

  int d = comp(a, b, c);
  d = a + b + c + d;
}
```

```
int comp (int x, int y, int z) {
  return (x + y – z);
}
```

- The main procedure in assembly is used for the main function.
- R0 is used for int a
- R1 is used for int b
- R2 is used for int c
- R3 is used for int d
- You don’t need to use the stack in the comp subroutine.
- The following is my code for the initialization of the variable. Complete the rest of that.

```
main:
  MOV R0, #30
  MOV R1, #40
  MOV R2, #50
  ...
```

2. (30 points) Make an assembly source code for the following C code. You will have to use the subroutine-call-related instructions (BL and BX) and also stack-related instructions (either PUSH/POP or manually adjust the stack pointer). Assume that R0 is used for int a and R1 is used for int b.



```
int main () {
  int a = 100;

  int b = sum(a);
}
```

```
int sum (int x) {
  if (x == 1)
    return 1;
  else
    return x+sum(x-1);
}
```

3. (20 points) The following code does a certain task. If you run the program, it sometimes inserts (push) some data into the stack and sometimes removes (pop) the data from the stack. What is the maximum number of elements stored in the stack while it is running?

```
main:
  MOV R0, #1
  MOV R1, #10
  BL comp
  B finish

comp:
  CMP R0, R1
  BLT inc0
  BX LR

inc0:
  PUSH {R0}
  PUSH {R14}
  ADD R0, R0, #2
  BL inc1
  POP {R14}
  POP {R0}
  BX LR

finish:
.end

inc1:
  PUSH {R1}
  PUSH {R14}
  ADD R1, R1, #1
  CMP R0, R1
  BGE inc1_proc1
  BL inc0
inc1_proc1:
  POP {R14}
  POP {R1}
  BX LR
```