

Homework Assignment 2

(Due 2:10pm, Oct. 9, scan (or take a photo) and upload it in Canvas)

You can use the following instructions only for this homework.

- Instructions
 - ADD R\$, R%, R&
 - ADD R\$, R%, #imm
 - SUB R\$, R%, R&
 - SUB R\$, R%, #imm
 - AND R\$, R%, R& // logical AND
 - AND R\$, R%, #imm
 - ORR R\$, R%, R& // logical OR
 - ORR R\$, R%, #imm
 - EOR R\$, R%, R& // logical XOR
 - EOR R\$, R%, #imm
 - CMP R\$, R%
 - CMP R\$, #imm
 - BGE, BLT, BGT, BLE, BEQ, BNE, B
 - MOV R\$, R% // R\$ = R%
 - MOV R\$, #imm
 - MOR R\$, R%, LSL #imm (or LSR #imm)

1. (50 points) Write an assembly code for the following C code.

```
int a, b, c, d;
...

while ( a > b ) {
    a--;
    b++;
    while ( c <= d ) {
        c++;
        d--;
        while ( a >= d ) {
            a--;
            d += 2;
        }
    }
}
```

- Assume that a is in R0, b is in R1, c is in R2, and d is in R3.
- The exit point (the end of the code) could be just an address label.

```

while_1:
    CMP R0, R1
    BLE while_1_end
    SUB R0, R0, #1
    ADD R1, R1, #1
while_2:
    CMP R2, R3
    BGT while_2_end
    ADD R2, R2, #1
    SUB R3, R3, #1
while_3:
    CMP R0, R3
    BLT while_3_end
    SUB R0, R0, #1
    ADD R3, R3, #2
    B while_3
while_3_end:
    B while_2
while_2_end:
    B while_1
while_1_end:

```

2. (50 points) Write an assembly code for the following C code.

```

int a, b, c, d;
...

for ( a = 0 ; a < 5 ; a++ ) {
    b++;
    if ( b > a ) {
        c--;
    }
    else if ( ( b <= c ) && ( a >= d ) ) {
        d++;
    }
    else {
        b++;
    }
}

```

- Assume that a is in R0, b is in R1, c is in R2, and d is in R3.

- The exit point (the end of the code) could be just an address label.

```
MOV R0, #0
for:
  CMP R0, #5
  BGE for_end
  ADD R1, R1, #1
  CMP R1, R0
  BLE if_else_if
  SUB R2, R2, #1
  B if_end
if_else_if:
  CMP R1, R2
  BGT if_else
  CMP R0, R3
  BLT if_else
  ADD R3, R3, #1
  B if_end
if_else:
  ADD R1, R1, #1
if_end:
  ADD R0, R0, #1
  B for
for_end:
```