## **Homework Assignment 4**

## (Due 2:10pm, Dec. 6, scan (or take a photo) and upload it in Canvas)

You should use the following instructions only.

- Instructions
  - o ADD, SUB, AND, ORR, EOR, MOV, MUL
  - o CMP, BGE/BLT/BGT/BLE/BEQ/BNE
  - o B, BL, BX
  - o LDR, STR, PUSH, POP
- 1. (100 points) Write an assembly code for the "for loop" in the following C code.

```
int^* x = new int[10];
                                     R15 (PC)
                                                                  0x0414
                                                    ...
int* y = new int[20];
                                    R14 (LR)
                                                 0x0410
                                                                  0x0410
for (int k = 0; k < 5; k++) {
                                    R13 (SP)
                                                 0x0404
                                                                  0x040C
 x[2*k] = y[4*k];
                                         R12
                                                                  0x0408
                                                                  0x0404
                                                   RF
                                                                  0x0400
                                                                  0x03FC
                                                                  0x03F8
```

Main memory

...

Х

У

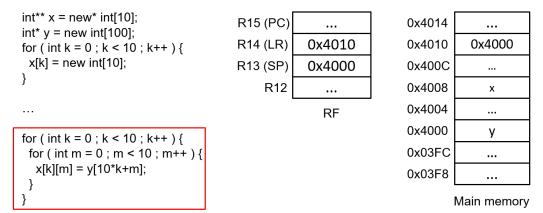
0x0410

0x0408

- R0-R12 are freely available.
- You can use any of R0-R12 for "int k" (i.e., you don't need to use the stack for k).

MOV R0, #0 loop: CMP R0, #5 BGE loop end LDR R1, [SP, #4] MUL R2, R0, #4 MUL R2, R2, #4 ADD R2, R1, R2 LDR R2, [R2] LDR R1. [SP, #12] MUL R3, R0, #2 MUL R3, R3, #4 ADD R3, R1, R3 STR R2, [R3] ADD R0, R0, #1 B loop loop end:

2. (100 points) Write an assembly code for the "nested for loop" (in the rectangle) in the following C code.



- R0-R12 are freely available.
- You can use any of R0-R12 for "int k" and "int m" (you don't need to use the stack for them).

MOV R0, #0 loop1: CMP R0, #10 BGE loop1 end MOV R1, #0 loop2: CMP R1, #10 BGE loop2 end LDR R2, [SP] MUL R3, R0, #10 ADD R3, R3, R1 MUL R3, R3, #4 LDR R2, [R3] LDR R3, [SP, #8] MUL R4, R0, #4 ADD R4, R3, R4 LDR R3, [R4] MUL R4, R1, #4 ADD R4, R3, R4 STR R2, [R4] ADD R1, R1, #1 B loop2 loop2 end: ADD R0, R0, #1 B loop1 loop1\_end: