Homework Assignment 4

(Due 2:00pm, Dec. 11, email to daehyun.kim@wsu.edu)

Late submissions will not be accepted.

* You can use the following instruction for a multiplication:

MUL Rd, Rs1, Rs2 // Rd = Rs1 * Rs2 (e.g., MUL R2, R4, R6 means R2 = R4 * R6)

MUL Rd, Rs, #imm // Rd = Rs * #imm (e.g., MUL R3, R0, #5 means R3 = R0 * 5)

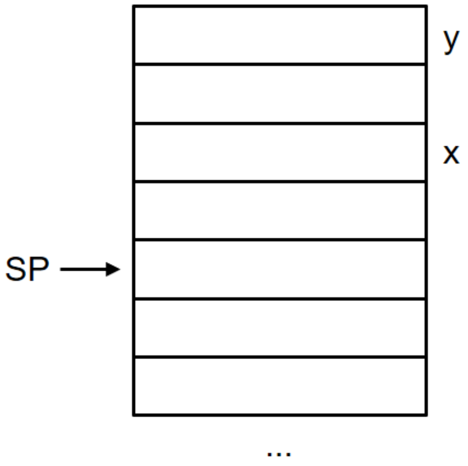
1. (100 points) Make an assembly code **only for the nested for loop**. You can use R0 for variable i and R1 for variable k. The memory figure shows the current stack pointer (SP) and the memory spaces used for variable x and y.

```
int y[2][3];

int** x = new int*[2];

for ( int i = 0 ; i < 2 ; i++ )
  x[i] = new int[3];

for ( int i = 0 ; i < 2 ; i++ ) {
  for ( int k = 0 ; k < 3 ; k++ )
    x[i][k] = y[i][k];
}
```



```
     MOV R0, #0
loop1:
     CMP R0, #2
     BGE finish
     MOV R1, #0
loop2:
     CMP R1, #3
     BGE loop3
     MUL R3, R0, #3     // i*3
     ADD R3, R3, R1     // i*3+k
     MUL R3, R3, #4     // 4*(i*3+k)
```

```
        ADD R3, R3, SP
        LDR R4, [R3, #16]    // R4 = y[i][k]
        LDR R5, [SP, #8]     // x
        MUL R6, R0, #4       // 4*i
        ADD R5, R5, R6       // &(x[i])
        LDR R5, [R5]         // x[i]
        MUL R6, R1, #4       // 4*k
        ADD R5, R5, R6       // &(x[i][k])
        STR R4, [R5]         // x[i][k] = y[i][k]
        ADD R1, R1, #1
        B loop2
loop3:
        ADD R0, R0, #1
        B loop1
.finish
```