

Lab- 6:

Objective - 1: Find the factorial of a given 8-bit number.

Program:

```
        AREA FACTORIAL, CODE, READONLY
        ENTRY
START
        MOV R0, #5      ;n
        MOV R1, #1      ;result
fact_loop
        CMP R0, #0
        BEQ end_loop    ; If R0 = 0, branch to end_loop
        MUL R2, R1, R0
        MOV R1, R2      ; R1 = R1 * R0
        SUBS R0, R0, #1  ; R0 = R0 - 1
        B fact_loop     ; Repeat the loop
end_loop
        LDR R2, =RESULT  ; Store the result in memory
        STR R1, [R2]
EXT B EXT
        AREA RES, DATA, READWRITE
RESULT DCD 0X0
        END

;      C-CODE FOR FACTORIAL
;if (n == 0) {
;    return 1;
; }
; return n * factorial(n - 1);
; }
```

```

1      AREA FACTORIAL, CODE, READONLY
2      ENTRY
3      START
4      MOV R0, #5          ; n = 5
5      MOV R1, #1          ; RESULT INITIALIZE TO 1
6      fact_loop
7      CMP R0, #0
8      BEQ end_loop        ; If R0 = 0, branch to end_loop
9      MUL R2, R1, R0
10     MOV R1, R2           ; R1 = R1 * R0
11     SUBS R0, R0, #1      ; R0 = R0 - 1
12     B fact_loop         ; Repeat the loop
13     end_loop
14     LDR R2, =RESULT      ; Store the result in memory
15     STR R1, [R2]

```

Memory 1	
Address:	0x40000000
0x40000000:	78 00 00 00 00 00 00
0x40000007:	00 00 00 00 00 00 00
0x4000000E:	00 00 00 00 00 00 00
0x40000015:	00 00 00 00 00 00 00
0x4000001C:	00 00 00 00 00 00 00
0x40000023:	00 00 00 00 00 00 00
0x4000002A:	00 00 00 00 00 00 00
0x40000031:	00 00 00 00 00 00 00

Objective - 2: Find the Fibonacci Series up to n digits.

Program:

```

      AREA fibnacci, CODE, READONLY
      ENTRY
START
      MOV R1, #01
      MOV R2, #00
      MOV R3, #00
      LDR R0, =COUNT
      LDR R6, =FIB_SERIES
      LDRB R5, [R0]
      CMP R5, #1
      BLE STOP1
      STRB R2, [R6], #01
      SUBS R5, R5, #01
      STRB R1, [R6], #01
BACK
      SUBS R5, R5, #01
      BEQ STOP
      ADD R3, R1, R2
      STRB R3, [R6], #01
      MOV R2, R1
      MOV R1, R3
      B BACK
STOP1 STRB R3, [R6]
STOP  B STOP
COUNT DCB 0x0A ; N = 10
      AREA DATA1, DATA, READWRITE

```

FIB_SERIES DCB 0X0,0X0,0X0,0X0,0X0,0X0,0X0,0X0,0X0,0X0
END

RESULT:

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17

AREA fibnacci, CODE, READONLY
ENTRY
START
mov r1, #01
mov r2, #00
mov r3, #00
ldr r0, =count
ldr r6, =fib_series
ldrb r5, [r0]
cmp r5, #1
ble stop1
strb r2, [r6], #01
subs r5, r5, #01
strb r1, [r6], #01
subs r5, r5, #01
beq stop
add r2, r1, r2

Memory 1

Address: 0X40000000

0x40000000: 00 01 01 02 03 05 08 0D 15 22 00
0x4000000B: 00 00 00 00 00 00 00 00 00 00 00
0x40000016: 00 00 00 00 00 00 00 00 00 00 00
0x40000021: 00 00 00 00 00 00 00 00 00 00 00
0x4000002C: 00 00 00 00 00 00 00 00 00 00 00
0x40000037: 00 00 00 00 00 00 00 00 00 00 00
0x40000042: 00 00 00 00 00 00 00 00 00 00 00

Call Stack + LocalsMemory 1