

Problem One — Code Analysis

Code:

```
ORG 100h  
MOV AX, 1  
MOV CX, data  
START_LOOP:  
    MUL CX  
    LOOP START_LOOP data  
DW 0005h  
END
```

Explanation of Functionality:

The program initializes AX = 1 and loads CX with the memory value data = 0005h. The MUL CX instruction multiplies AX by CX each iteration. The LOOP instruction decrements CX and repeats the loop until CX = 0.

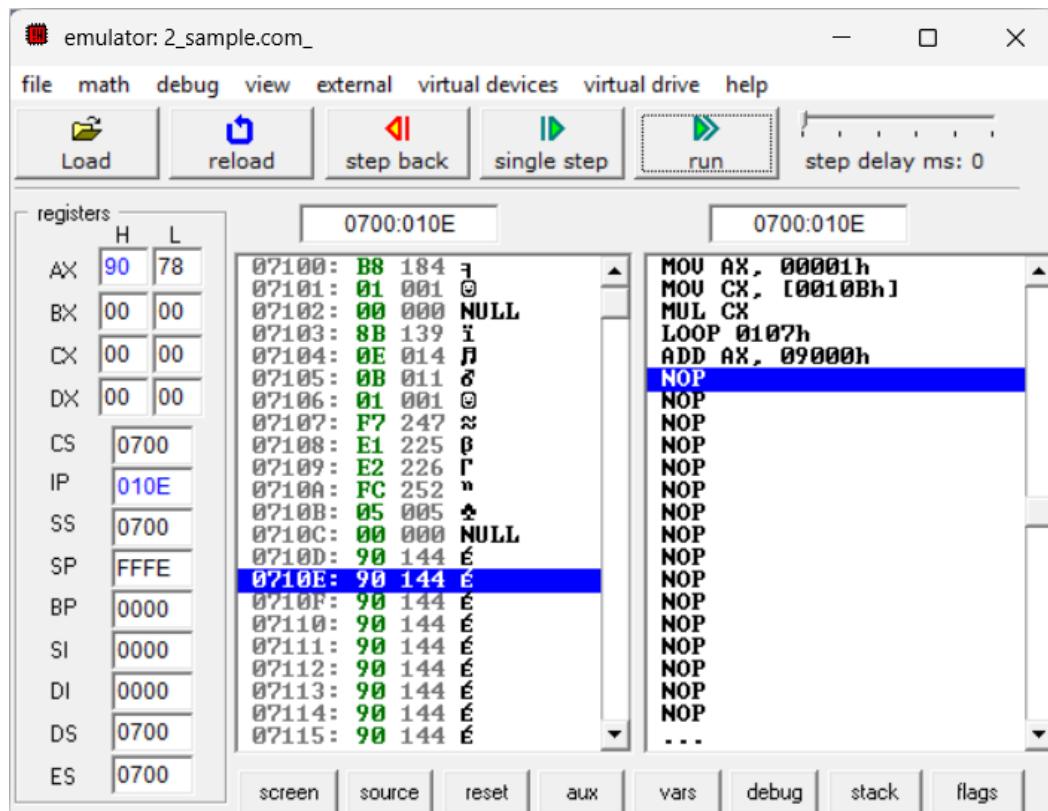
Behavior summary:

$$AX = 1 \times 5 \times 4 \times 3 \times 2 \times 1 = 120 \text{ (decimal)}$$

Register Behavior:

- AX: Updated after each multiplication; final value is the factorial of 5.
- CX: Initially loaded with 5, then decremented each iteration.

You can see the result of factorial in register **AL**:



Problem Two — Summation Program

Problem Description:

Write a program that reads two bytes: a start value and a range, then sums all numbers from start to start + range -

Code:

```
ORG 100h

MOV BL, 5          ; Start Value
MOV BH, 0
MOV CL, 10         ; Range Value
MOV CH, 0

MOV AX, 0          ; accumulator
sum_loop:
    ADD AX, BX
    INC BX
    LOOP sum_loop

; Display result
MOV BL, 10
DIV BL

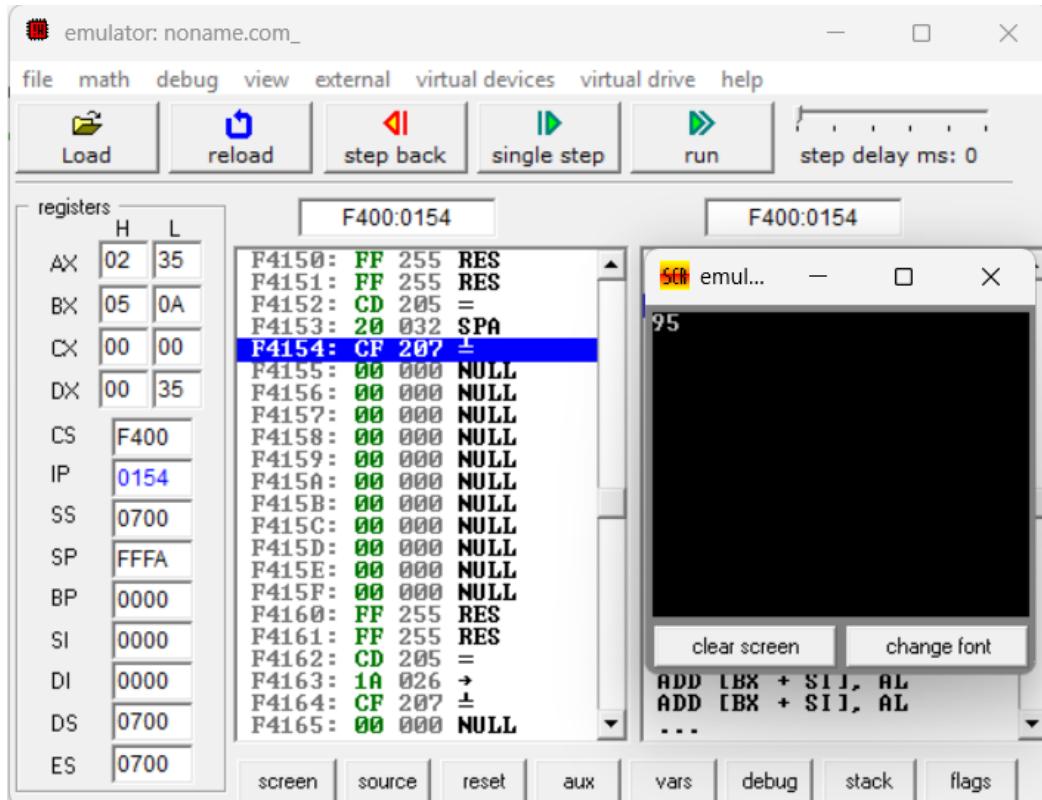
MOV BH, AH

ADD AL, 48
MOV DL, AL
MOV AH, 2
INT 21h

MOV DL, BH
ADD DL, 48
MOV AH, 2
INT 21h

RET
```

Result of the loop is printed on the Screen: 95 (result from the lab example)



Problem Three — Adding Two 10-Byte Numbers

Description:

Write a program that stores two 10-byte numbers, adds them byte by byte with carry, and stores the result at memory location 500h.

Program Code:

```
ORG 100h

; 10-Byte Addition Routine
MOV SI, OFFSET num1 + 9
MOV DI, OFFSET num2 + 9
MOV BX, 500h
MOV CX, 10
CLC

add_loop:
    MOV AL, [SI]
    ADC AL, [DI]
    MOV [BX], AL
    DEC SI
    DEC DI
    INC BX

    LOOP add_loop

; Write final carry byte

MOV AL, 0
ADC AL, 0
MOV [BX], AL

RET

; input Section

num1 DB 0, 1, 2, 3, 4, 5, 6, 7, 8, 9
num2 DB 10, 9, 8, 7, 6, 5, 4, 3, 2, 1
```

Result can bee seen in address 500 in memory for this example:

Random Access Memory											
0700:0500	0A	0A	0A	0A	0A	0A	0A-0A	0A	00	00	00
0700:0510	00	00	00	00	00	00	00-00	00	00	00	00
0700:0520	00	00	00	00	00	00	00-00	00	00	00	00
0700:0530	00	00	00	00	00	00	00-00	00	00	00	00
0700:0540	00	00	00	00	00	00	00-00	00	00	00	00
0700:0550	00	00	00	00	00	00	00-00	00	00	00	00
0700:0560	00	00	00	00	00	00	00-00	00	00	00	00
0700:0570	00	00	00	00	00	00	00-00	00	00	00	00
0700:0580	00	00	00	00	00	00	00-00	00	00	00	00
0700:0590	00	00	00	00	00	00	00-00	00	00	00	00
0700:05A0	00	00	00	00	00	00	00-00	00	00	00	00
0700:05B0	00	00	00	00	00	00	00-00	00	00	00	00
0700:05C0	00	00	00	00	00	00	00-00	00	00	00	00
0700:05D0	00	00	00	00	00	00	00-00	00	00	00	00
0700:05E0	00	00	00	00	00	00	00-00	00	00	00	00
0700:05F0	00	00	00	00	00	00	00-00	00	00	00	00
0700:0600	00	00	00	00	00	00	00-00	00	00	00	00
0700:0610	00	00	00	00	00	00	00-00	00	00	00	00
0700:0620	00	00	00	00	00	00	00-00	00	00	00	00
0700:0630	00	00	00	00	00	00	00-00	00	00	00	00
0700:0640	00	00	00	00	00	00	00-00	00	00	00	00
0700:0650	00	00	00	00	00	00	00-00	00	00	00	00
0700:0660	00	00	00	00	00	00	00-00	00	00	00	00
0700:0670	00	00	00	00	00	00	00-00	00	00	00	00
0700:0680	00	00	00	00	00	00	00-00	00	00	00	00
0700:0690	00	00	00	00	00	00	00-00	00	00	00	00
0700:06A0	00	00	00	00	00	00	00-00	00	00	00	00
0700:06B0	00	00	00	00	00	00	00-00	00	00	00	00
0700:06C0	00	00	00	00	00	00	00-00	00	00	00	00
0700:06D0	00	00	00	00	00	00	00-00	00	00	00	00
0700:06E0	00	00	00	00	00	00	00-00	00	00	00	00
0700:06F0	00	00	00	00	00	00	00-00	00	00	00	00
0700:0700	00	00	00	00	00	00	00-00	00	00	00	00
0700:0710	00	00	00	00	00	00	00-00	00	00	00	00
0700:0720	00	00	00	00	00	00	00-00	00	00	00	00
0700:0730	00	00	00	00	00	00	00-00	00	00	00	00
0700:0740	00	00	00	00	00	00	00-00	00	00	00	00
0700:0750	00	00	00	00	00	00	00-00	00	00	00	00
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