Assignment 1

Question 1

Objective

Find out the sum of the **first 30 natural numbers**.

Tool / Experimental setup considered
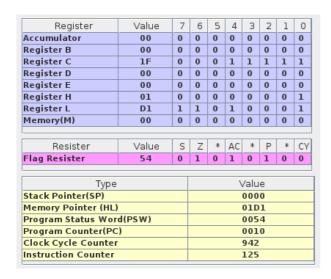
- Used Jubin's 8085 Simulator.

Procedure

The sum of first 30 natural numbers is `435` i.e `0x01D1` . Since the value is greater than `256` we need two register pair to store the value.

Program

```
        LXI H,0000  ; Load H-L pair with 0000H, it will be used as an accumulator
        MVI D,1E    ; Move immediate data to register, D storing 0x1E = 30
        MVI C,01    ; B-C pair storing 00-01

L1:     DAD B       ; Double ADd
        INX B       ; INcrementeXtended register, increments B-C
        DCR D       ; DeCRement, decrements D
        JNZ L1      ; Jump Not Zero
        SHLD 8085   ; Store HLpair using Direct addressing, storing the data in 8085
        HLT  ; Halt
```

Experimentation

Register	Value	7	6	5	4	3	2	1	0
Accumulator	00	0	0	0	0	0	0	0	0
Register B	00	0	0	0	0	0	0	0	0
Register C	1F	0	0	0	1	1	1	1	1
Register D	00	0	0	0	0	0	0	0	0
Register E	00	0	0	0	0	0	0	0	0
Register H	01	0	0	0	0	0	0	0	1
Register L	D1	1	1	0	1	0	0	0	1
Memory(M)	00	0	0	0	0	0	0	0	0

Resister	Value	S	Z	*	AC	*	P	*	CY
Flag Resister	54	0	1	0	1	0	1	0	0

Type	Value
Stack Pointer(SP)	0000
Memory Pointer (HL)	01D1
Program Status Word(PSW)	0054
Program Counter(PC)	0010
Clock Cycle Counter	942
Instruction Counter	125

Conclusion

Finally the data stored in HL register pair is `0x01D1` i.e `435` . This is the sum of first 30 natural numbers.**Hence the program is working as expected.**

Question 2

Objective

From an array of 10-byte size integers (unsigned) find out the maximum and minimum.

Tool / Experimental setup considered

- Used Jubin's 8085 Simulator.

Procedure

Loop through the entire array of integers, and store the maximum and minimum values in the registers.

Program

```
# ORG 4200H
# ARR: DB 9, 1, 8, 4, 8, A, F, 5
# LEN EQU 08
# ORG 0000H
        LXI H,ARR
        MVI B,LEN ; number of elements
        MOV D,M  ; storing the min in D
        MOV C,M  ; storing the max in C
        DCR B

LOOP:
        INX H
        MOV A,M
        CMP D
        JNC MAX
        MOV D,M

MAX:
        CMP C
        JC AHEAD
        MOV C,A

AHEAD:
        DCR B
        JNZ LOOP
        MOV A,D
```

```
    STA 4300
    MOV A,C
    STA 4400
    HLT
```

Experimentation

Register	Value	7	6	5	4	3	2	1	0
Accumulator	0F	0	0	0	0	1	1	1	1
Register B	00	0	0	0	0	0	0	0	0
Register C	0F	0	0	0	0	1	1	1	1
Register D	01	0	0	0	0	0	0	0	1
Register E	00	0	0	0	0	0	0	0	0
Register H	42	0	1	0	0	0	0	1	0
Register L	07	0	0	0	0	0	1	1	1
Memory(M)	05	0	0	0	0	0	1	0	1

4200	09
4201	01
4202	08
4203	04
4204	08
4205	0A
4206	0F
4207	05
4300	01
4400	0F

Conclusion

After the execution the maximum value is stored in register C and the minimum in register D.

Question 3

Objective

Write a routine that produces a delay. The delay value must be passed to register pair DE.

Tool / Experimental setup considered

- Used Jubin's 8085 Simulator.

Procedure

We can simulate the delay by running a long loop. The loop will be executed for the number of times specified in DE register pair.

Program

```
       LXI D, E000H
       CALL DELAY
       HLT
DELAY: DCX D
       MOV A, D
       ORA E
       JNZ DELAY
       RET
```

Conclusion

Will notice the code runs for sometime and the value of DE register pair is decremented. Hence the delay is produced.