Name : **Enas Morsy Mohamed Shehata**

ID : **20**

Micro : LAB2

Problem 1 :

Write a program that sums six elements (bytes), stored in memory starting from address 300, but ignores those that are 80 hex or above (80h) OR 20 hex or below (20h). Program should stop after 6 comparisons even if numbers were added or not.

The program :

- Start the sum (AX) with zero.
- Start the address (BX)with 2ff to be added one equals 300.
- Start the counter(CX) with 0.
- Add one to the address .
- Read the element in DX.
- Check if it's greater than or equal 80 return to the loop .
- Check if it's smaller than or equal 20 return to the loop.
- Otherwise add it to the sum and

check if the counter does not exceed 6 return to the loop.

```
D:\>debug.exe
-E 300 10 20 40 50 80 90
-E 400 06 00
-E 500 80
-E 600 20
-A 100
```

```
073F:0100 MOV AX,0
073F:0103 MOV BX,2FF
073F:0106 MOV CX,0
073F:0109 ADD BX,1
073F:010C MOV DL,[BX]
073F:010E CMP DL,[500]
073F:0112 JAE 11C
073F:0114 CMP DL,[600]
073F:0118 JBE 11C
073F:011A ADD AX,DX
073F:011C ADD CX,1
073F:011F CMP CX,[400]
073F:0123 JB 109
073F:0125 INT 3
073F:0126
```
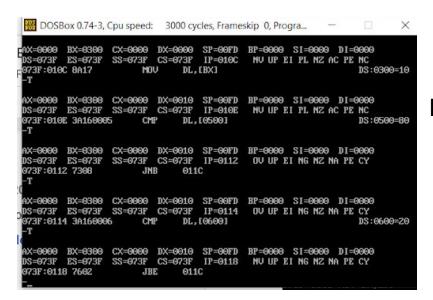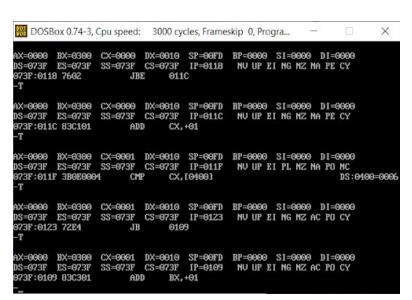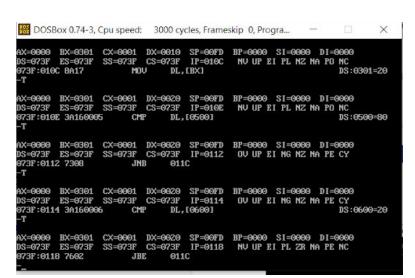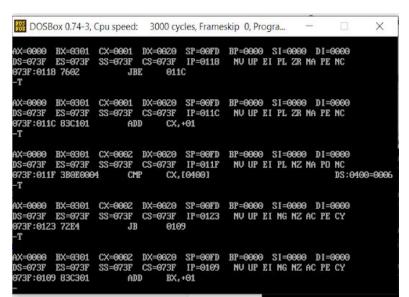
Sample run :

First element DX=10

10 is less than 20 then AX = 0.

CX=1 .

BX=301

DX = 20

```
AX=0000  BX=0301  CX=0001  DX=0020  SP=00FD  BP=0000  SI=0000  DI=0000
DS=073F  ES=073F  SS=073F  CS=073F  IP=0118    NV UP EI PL ZR NA PE NC
073F:0118 7602          JBE     011C
-T

AX=0000  BX=0301  CX=0001  DX=0020  SP=00FD  BP=0000  SI=0000  DI=0000
DS=073F  ES=073F  SS=073F  CS=073F  IP=011C    NV UP EI PL ZR NA PE NC
073F:011C 83C101         ADD     CX,+01
-T

AX=0000  BX=0301  CX=0002  DX=0020  SP=00FD  BP=0000  SI=0000  DI=0000
DS=073F  ES=073F  SS=073F  CS=073F  IP=011F    NV UP EI PL NZ NA PO NC
073F:011F 3B0E0004       CMP     CX,[0400]                     DS:0400=0006
-T

AX=0000  BX=0301  CX=0002  DX=0020  SP=00FD  BP=0000  SI=0000  DI=0000
DS=073F  ES=073F  SS=073F  CS=073F  IP=0123    NV UP EI NG NZ AC PE CY
073F:0123 72E4           JB      0109
-T

AX=0000  BX=0301  CX=0002  DX=0020  SP=00FD  BP=0000  SI=0000  DI=0000
DS=073F  ES=073F  SS=073F  CS=073F  IP=0109    NV UP EI NG NZ AC PE CY
073F:0109 83C301         ADD     BX,+01
```

20 is equal to 20

so

AX=0

CX=2

```
AX=0000  BX=0302  CX=0002  DX=0020  SP=00FD  BP=0000  SI=0000  DI=0000
DS=073F  ES=073F  SS=073F  CS=073F  IP=010C    NV UP EI PL NZ NA PO NC
073F:010C 8A17           MOV     DL,[BX]                       DS:0302=40
-T

AX=0000  BX=0302  CX=0002  DX=0040  SP=00FD  BP=0000  SI=0000  DI=0000
DS=073F  ES=073F  SS=073F  CS=073F  IP=010E    NV UP EI PL NZ NA PO NC
073F:010E 3A160005       CMP     DL,[0500]                     DS:0500=80
-T

AX=0000  BX=0302  CX=0002  DX=0040  SP=00FD  BP=0000  SI=0000  DI=0000
DS=073F  ES=073F  SS=073F  CS=073F  IP=0112    OV UP EI NG NZ NA PE CY
073F:0112 7308           JNB     011C
-T

AX=0000  BX=0302  CX=0002  DX=0040  SP=00FD  BP=0000  SI=0000  DI=0000
DS=073F  ES=073F  SS=073F  CS=073F  IP=0114    OV UP EI NG NZ NA PE CY
073F:0114 3A160006       CMP     DL,[0600]                     DS:0600=20
-T

AX=0000  BX=0302  CX=0002  DX=0040  SP=00FD  BP=0000  SI=0000  DI=0000
DS=073F  ES=073F  SS=073F  CS=073F  IP=0118    NV UP EI PL NZ NA PO NC
073F:0118 7602           JBE     011C
```
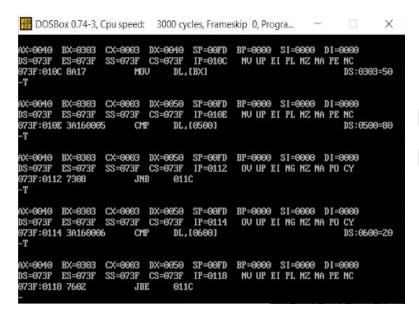
BX=302

DX=40

```
AX=0000  BX=0302  CX=0002  DX=0040  SP=00FD  BP=0000  SI=0000  DI=0000
DS=073F  ES=073F  SS=073F  CS=073F  IP=0118    NV UP EI PL NZ NA PO NC
073F:0118 7602           JBE     011C
-T

AX=0000  BX=0302  CX=0002  DX=0040  SP=00FD  BP=0000  SI=0000  DI=0000
DS=073F  ES=073F  SS=073F  CS=073F  IP=011A    NV UP EI PL NZ NA PO NC
073F:011A 01D0           ADD     AX,DX
-T

AX=0040  BX=0302  CX=0002  DX=0040  SP=00FD  BP=0000  SI=0000  DI=0000
DS=073F  ES=073F  SS=073F  CS=073F  IP=011C    NV UP EI PL NZ NA PO NC
073F:011C 83C101         ADD     CX,+01
-T

AX=0040  BX=0302  CX=0003  DX=0040  SP=00FD  BP=0000  SI=0000  DI=0000
DS=073F  ES=073F  SS=073F  CS=073F  IP=011F    NV UP EI PL NZ NA PE NC
073F:011F 3B0E0004       CMP     CX,[0400]                     DS:0400=0006
-T

AX=0040  BX=0302  CX=0003  DX=0040  SP=00FD  BP=0000  SI=0000  DI=0000
DS=073F  ES=073F  SS=073F  CS=073F  IP=0123    NV UP EI NG NZ AC PO CY
073F:0123 72E4           JB      0109
```

20<40<80

AX=40

CX=3

BX=303

DX=50

AX=40+50=90

CX=4

BX=304

DX=80

AX=90 doesn't change

CX=5

```
DOSBox 0.74-3, Cpu speed:    3000 cycles, Frameskip 0, Progra...   —   □   ×

AX=0090  BX=0305  CX=0005  DX=0080  SP=00FD  BP=0000  SI=0000  DI=0000
DS=073F  ES=073F  SS=073F  CS=073F  IP=010C   NV UP EI PL NZ NA PE NC
073F:010C 8A17        MOV     DL,[BX]                          DS:0305=90
-T

AX=0090  BX=0305  CX=0005  DX=0090  SP=00FD  BP=0000  SI=0000  DI=0000
DS=073F  ES=073F  SS=073F  CS=073F  IP=010E   NV UP EI PL NZ NA PE NC
073F:010E 3A160005      CMP     DL,[0500]                      DS:0500=80
-T

AX=0090  BX=0305  CX=0005  DX=0090  SP=00FD  BP=0000  SI=0000  DI=0000
DS=073F  ES=073F  SS=073F  CS=073F  IP=0112   NV UP EI PL NZ NA PO NC
073F:0112 7308         JNB     011C
-T

AX=0090  BX=0305  CX=0005  DX=0090  SP=00FD  BP=0000  SI=0000  DI=0000
DS=073F  ES=073F  SS=073F  CS=073F  IP=011C   NV UP EI PL NZ NA PO NC
073F:011C 83C101       ADD     CX,+01
-T

AX=0090  BX=0305  CX=0006  DX=0090  SP=00FD  BP=0000  SI=0000  DI=0000
DS=073F  ES=073F  SS=073F  CS=073F  IP=011F   NV UP EI PL NZ NA PE NC
073F:011F 3B0E0004      CMP     CX,[0400]                      DS:0400=0006
-
```

BX=305

DX=90

CX=6


```
DOSBox 0.74-3, Cpu speed:    3000 cycles, Frameskip 0, Progra...   —   □   ×

AX=0090  BX=0305  CX=0005  DX=0090  SP=00FD  BP=0000  SI=0000  DI=0000
DS=073F  ES=073F  SS=073F  CS=073F  IP=0112   NV UP EI PL NZ NA PO NC
073F:0112 7308         JNB     011C
-T

AX=0090  BX=0305  CX=0005  DX=0090  SP=00FD  BP=0000  SI=0000  DI=0000
DS=073F  ES=073F  SS=073F  CS=073F  IP=011C   NV UP EI PL NZ NA PO NC
073F:011C 83C101       ADD     CX,+01
-T

AX=0090  BX=0305  CX=0006  DX=0090  SP=00FD  BP=0000  SI=0000  DI=0000
DS=073F  ES=073F  SS=073F  CS=073F  IP=011F   NV UP EI PL NZ NA PE NC
073F:011F 3B0E0004      CMP     CX,[0400]                      DS:0400=0006
-T

AX=0090  BX=0305  CX=0006  DX=0090  SP=00FD  BP=0000  SI=0000  DI=0000
DS=073F  ES=073F  SS=073F  CS=073F  IP=0123   NV UP EI PL ZR NA PE NC
073F:0123 72E4         JB      0109
-T

AX=0090  BX=0305  CX=0006  DX=0090  SP=00FD  BP=0000  SI=0000  DI=0000
DS=073F  ES=073F  SS=073F  CS=073F  IP=0125   NV UP EI PL ZR NA PE NC
073F:0125 CC           INT     3
-
```
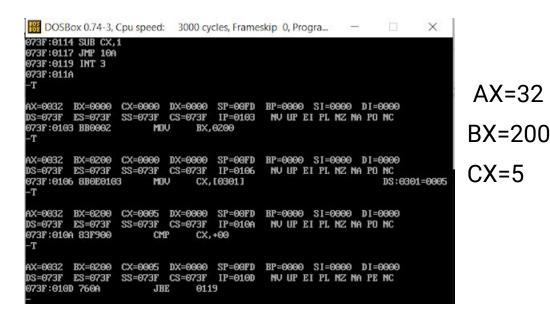
The program has ended .

Problem 2 :

Write a program that copies the byte found in memory location 0300 into the memory start-ing from location 200 through a number of times given by the memory location 0301. Make sure it works properly if the number of times = 00.
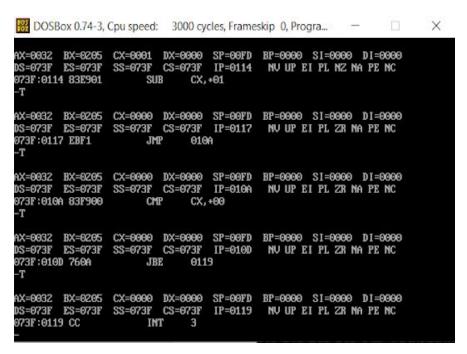
The program :

- Read the bytes from location 300 and store it in AL.
- Start the address(BX) with 200.
- Start the counter(CX) with the number of times stored in location 301 .
- Compare the counter with zero .
- Move the AL to the location of the address .
- Add one to the address .
- Subtract one from the counter .
- Return to the main loop.

```
D:\>debug.exe
-E 300 32 05
-A 100
073F:0100 MOV AL,[300]
073F:0103 MOV BX,200
073F:0106 MOV CX,[301]
073F:010A CMP CX,0
073F:010D JBE 119
073F:010F MOV [BX],AL
073F:0111 ADD BX,1
073F:0114 SUB CX,1
073F:0117 JMP 10A
073F:0119 INT 3
073F:011A
-
```

Sample run :

```
DOSBox 0.74-3, Cpu speed:   3000 cycles, Frameskip 0, Progra...     —    □    ×
073F:0114 SUB CX,1
073F:0117 JMP 10A
073F:0119 INT 3
073F:011A
-T

AX=0032  BX=0000  CX=0000  DX=0000  SP=00FD  BP=0000  SI=0000  DI=0000
DS=073F  ES=073F  SS=073F  CS=073F  IP=0103  NU UP EI PL NZ NA PO NC
073F:0103 BB0002           MOV     BX,0200
-T

AX=0032  BX=0200  CX=0000  DX=0000  SP=00FD  BP=0000  SI=0000  DI=0000
DS=073F  ES=073F  SS=073F  CS=073F  IP=0106  NU UP EI PL NZ NA PO NC
073F:0106 8B0E0103         MOV     CX,[0301]                    DS:0301=0005
-T

AX=0032  BX=0200  CX=0005  DX=0000  SP=00FD  BP=0000  SI=0000  DI=0000
DS=073F  ES=073F  SS=073F  CS=073F  IP=010A  NU UP EI PL NZ NA PO NC
073F:010A 83F900           CMP     CX,+00
-T

AX=0032  BX=0200  CX=0005  DX=0000  SP=00FD  BP=0000  SI=0000  DI=0000
DS=073F  ES=073F  SS=073F  CS=073F  IP=010D  NU UP EI PL NZ NA PE NC
073F:010D 760A             JBE     0119
-
```

AX=32

BX=200

CX=5

```
DOS DOSBox 0.74-3, Cpu speed:    3000 cycles, Frameskip 0, Progra...    —    □    ×

AX=0032  BX=0205  CX=0001  DX=0000  SP=00FD  BP=0000  SI=0000  DI=0000
DS=073F  ES=073F  SS=073F  CS=073F  IP=0114   NU UP EI PL NZ NA PE NC
073F:0114 83E901         SUB     CX,+01
-T

AX=0032  BX=0205  CX=0000  DX=0000  SP=00FD  BP=0000  SI=0000  DI=0000
DS=073F  ES=073F  SS=073F  CS=073F  IP=0117   NU UP EI PL ZR NA PE NC
073F:0117 EBF1          JMP     010A
-T

AX=0032  BX=0205  CX=0000  DX=0000  SP=00FD  BP=0000  SI=0000  DI=0000
DS=073F  ES=073F  SS=073F  CS=073F  IP=010A   NU UP EI PL ZR NA PE NC
073F:010A 83F900         CMP     CX,+00
-T

AX=0032  BX=0205  CX=0000  DX=0000  SP=00FD  BP=0000  SI=0000  DI=0000
DS=073F  ES=073F  SS=073F  CS=073F  IP=010D   NU UP EI PL ZR NA PE NC
073F:010D 760A          JBE     0119
-T

AX=0032  BX=0205  CX=0000  DX=0000  SP=00FD  BP=0000  SI=0000  DI=0000
DS=073F  ES=073F  SS=073F  CS=073F  IP=0119   NU UP EI PL ZR NA PE NC
073F:0119 CC            INT     3
-
```

AFTER TRACING

CX=0 BX=205

```
AX=0032  BX=0205  CX=0000  DX=0000  SP=00FD  BP=0000  SI=0000  DI=0000
DS=073F  ES=073F  SS=073F  CS=073F  IP=0119   NU UP EI PL ZR NA PE NC
073F:0119 CC            INT     3
-T

AX=0032  BX=0205  CX=0000  DX=0000  SP=00F7  BP=0000  SI=0000  DI=0000
DS=073F  ES=073F  SS=073F  CS=01A3  IP=13B1   NU UP DI PL ZR NA PE NC
01A3:13B1 55            PUSH    BP
-D 200
073F:0200  32 32 32 32 32 00 00 00-00 00 00 00 00 00 00 00   22222...........
073F:0210  00 00 00 00 00 00 00 00-00 00 00 00 00 00 00 00   ................
073F:0220  00 00 00 00 00 00 00 00-00 00 00 00 00 00 00 00   ................
073F:0230  00 00 00 00 00 00 00 00-00 00 00 00 00 00 00 00   ................
073F:0240  00 00 00 00 00 00 00 00-00 00 00 00 00 00 00 00   ................
073F:0250  00 00 00 00 00 00 00 00-00 00 00 00 00 00 00 00   ................
073F:0260  00 00 00 00 00 00 00 00-00 00 00 00 00 00 00 00   ................
073F:0270  00 00 00 00 00 00 00 00-00 00 00 00 00 00 00 00   ................
-
                                        073F:0114 83E901      SUB   CX,+01
```

THE RESULT