LAB MANUAL: 1

TASK 1:

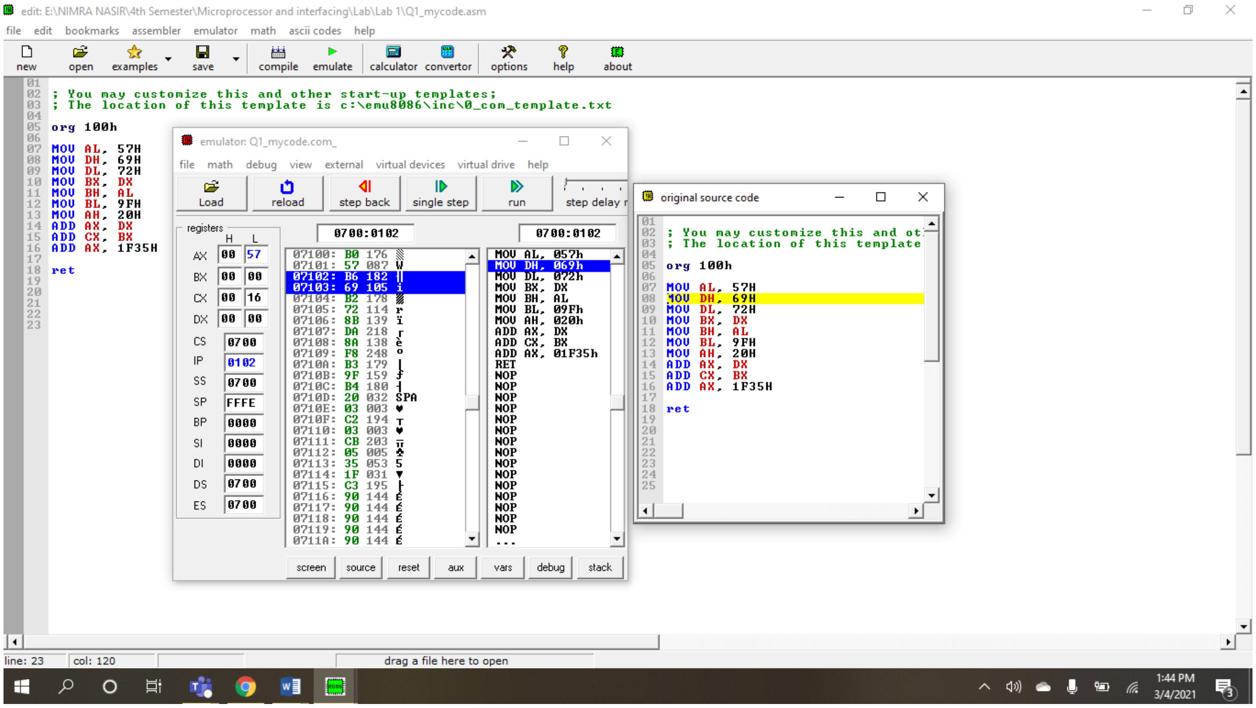
Write the following code in emulator and examine the contents of registers by single stepping

```
MOV AL, 57H
MOV DH, 69H
MOV DL, 72H
MOV BX, DX
MOV BH, AL
MOV BL, 9FH
MOV AH, 20H
ADD AX, DX
ADD CX, BX
ADD AX, 1F35H
```

Solution:

MOV AL, 57H

The hexadecimal value **57** will be shifted to the **lower portion** of the **AX** register.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```
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; The location of this template is c:\emu8086\inc\0_com_template.txt

org 100h

MOV AL, 57H
MOV DH, 69H
MOV DL, 72H
MOV BX, DX
MOV BH, AL
MOV BL, 9FH
MOV AH, 20H
ADD AX, DX
ADD CX, BX
ADD AX, 1F35H

ret
```

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registers

	H	L
AX	00	57
BX	00	00
CX	00	16
DX	00	00
CS	0700	
IP	0102	
SS	0700	
SP	FFFE	
BP	0000	
SI	0000	
DI	0000	
DS	0700	
ES	0700	

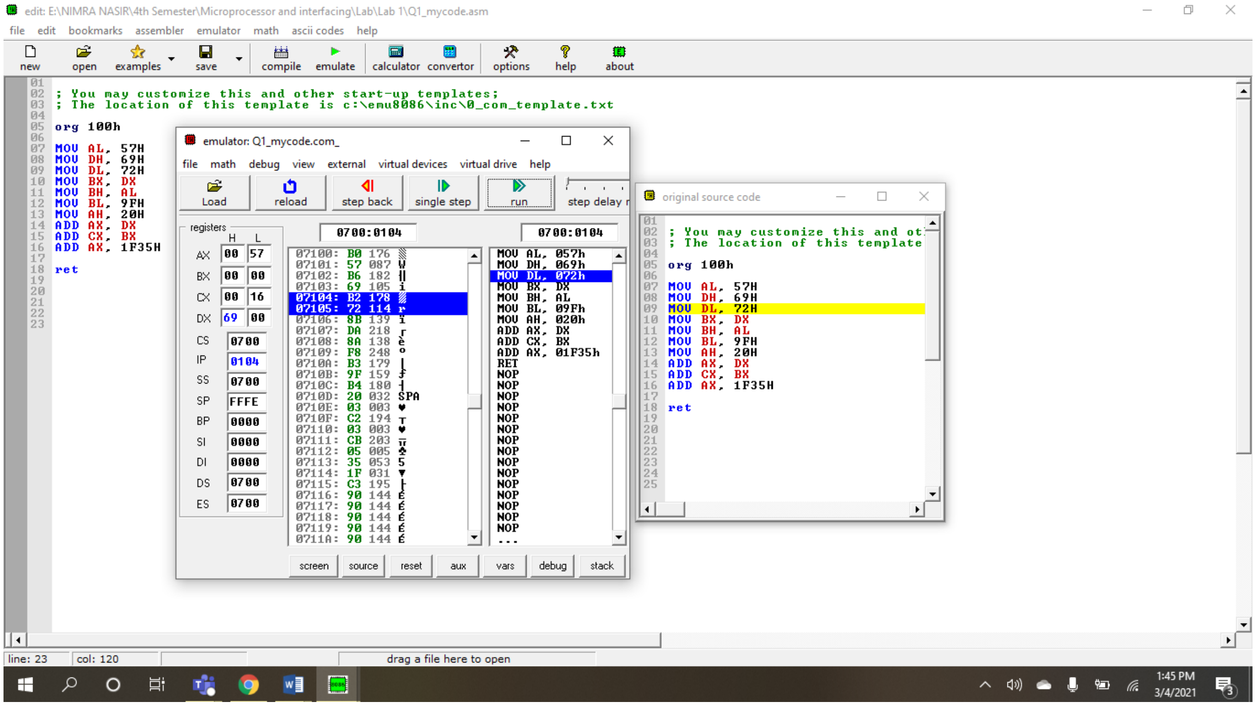
```
0700:0102

07100: B0 176 ▒
07101: 57 087 W
07102: B6 182 ╢
07103: 69 105 i
07104: B2 178 ▓
07105: 72 114 r
07106: 8B 139 ï
07107: DA 218 ┌
07108: 8A 138 è
07109: F8 248 °
0710A: B3 179 │
0710B: 9F 159 ƒ
0710C: B4 180 ┤
0710D: 20 032 SPA
0710E: 03 003 ♥
0710F: C2 194 ┬
07110: 03 003 ♥
07111: CB 203 ╦
07112: 05 005 ♣
07113: 35 053 5
07114: 1F 031 ▼
07115: C3 195 ├
07116: 90 144 É
07117: 90 144 É
07118: 90 144 É
07119: 90 144 É
0711A: 90 144 É
```

```
0700:0102

MOV AL, 057h
MOV DH, 069h
MOV DL, 072h
MOV BX, DX
MOV BH, AL
MOV BL, 09Fh
MOV AH, 020h
ADD AX, DX
ADD CX, BX
ADD AX, 01F35h
RET
NOP
NOP
NOP
NOP
NOP
NOP
NOP
NOP
NOP
NOP
NOP
NOP
NOP
NOP
NOP
...
```

```
; You may customize this and ot
; The location of this template

org 100h

MOV AL, 57H
MOV DH, 69H
MOV DL, 72H
MOV BX, DX
MOV BH, AL
MOV BL, 9FH
MOV AH, 20H
ADD AX, DX
ADD CX, BX
ADD AX, 1F35H

ret
```

MOV DH,69H

The hexadecimal value **69** will be shifted to the **High part** of the **DX** register.



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```
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org 100h

MOV AL, 57H
MOV DH, 69H
MOV DL, 72H
MOV BX, DX
MOV BH, AL
MOV BL, 9FH
MOV AH, 20H
ADD AX, DX
ADD CX, BX
ADD AX, 1F35H

ret
```

emulator: Q1_mycode.com_

```
registers  H   L
AX        00  57
BX        00  00
CX        00  16
DX        69  00
CS      0700
IP      0104
SS      0700
SP      FFFE
BP      0000
SI      0000
DI      0000
DS      0700
ES      0700
```

```
0700:0104

07100: B0 176 ▒
07101: 57 087 W
07102: B6 182 ╢
07103: 69 105 i
07104: B2 178 ▓
07105: 72 114 r
07106: 8B 139 ï
07107: DA 218 ┌
07108: 8A 138 è
07109: F8 248 °
0710A: B3 179 │
0710B: 9F 159 ƒ
0710C: B4 180 ┤
0710D: 20 032 SPA
0710E: 03 003 ♥
0710F: C2 194 ┬
07110: 03 003 ♥
07111: CB 203 ╦
07112: 05 005 ♣
07113: 35 053 5
07114: 1F 031 ▼
07115: C3 195 ├
07116: 90 144 É
07117: 90 144 É
07118: 90 144 É
07119: 90 144 É
0711A: 90 144 É
```

```
0700:0104

MOV AL, 057h
MOV DH, 069h
MOV DL, 072h
MOV BX, DX
MOV BH, AL
MOV BL, 09Fh
MOV AH, 020h
ADD AX, DX
ADD CX, BX
ADD AX, 01F35h
RET
NOP
NOP
NOP
NOP
NOP
NOP
NOP
NOP
NOP
NOP
NOP
NOP
NOP
NOP
...
```

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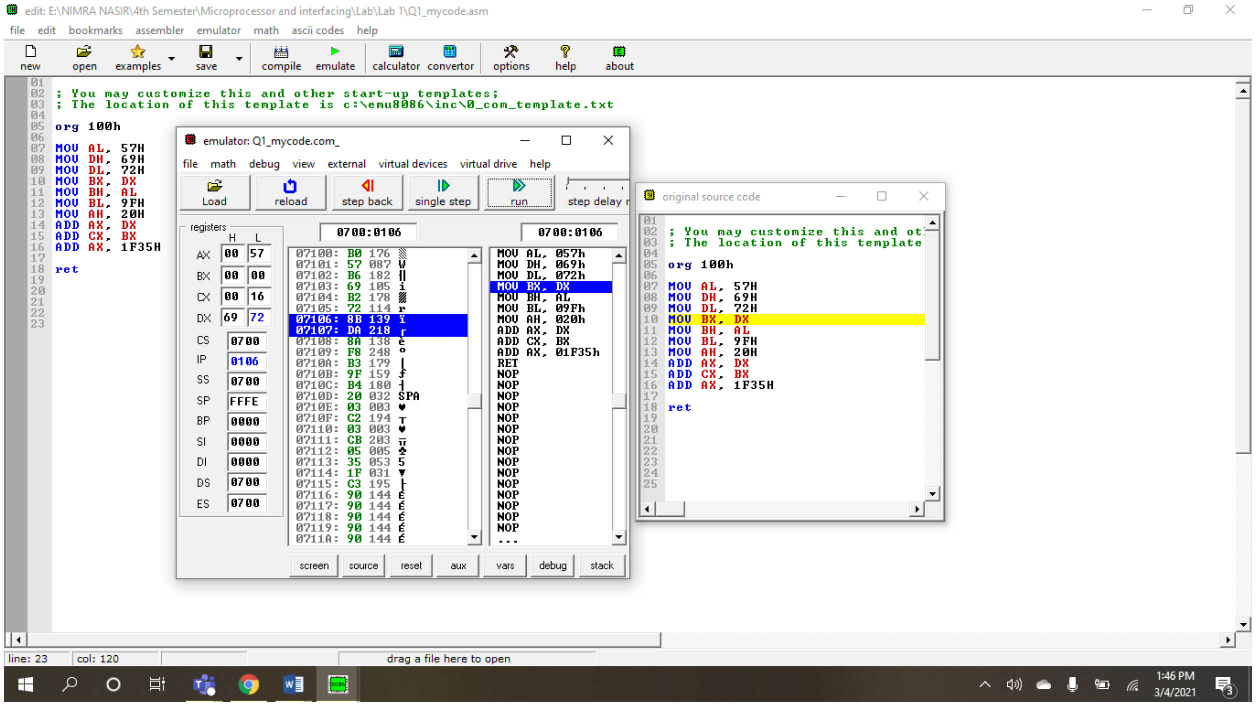
MOV DL, 72H

The hexadecimal value **72** will be shifted to the **lower portion** of the **DX** register.



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org 100h

MOV AL, 57H
MOV DH, 69H
MOV DL, 72H
MOV BX, DX
MOV BH, AL
MOV BL, 9FH
MOV AH, 20H
ADD AX, DX
ADD CX, BX
ADD AX, 1F35H

ret
```

emulator: Q1_mycode.com_

```
registers  H   L
AX        00  57
BX        00  00
CX        00  16
DX        69  72
CS      0700
IP      0106
SS      0700
SP      FFFE
BP      0000
SI      0000
DI      0000
DS      0700
ES      0700
```

```
0700:0106

07100: B0 176 ▒
07101: 57 087 W
07102: B6 182 ╢
07103: 69 105 i
07104: B2 178 ▓
07105: 72 114 r
07106: 8B 139 ï
07107: DA 218 ┌
07108: 8A 138 è
07109: F8 248 °
0710A: B3 179 │
0710B: 9F 159 ƒ
0710C: B4 180 ┤
0710D: 20 032 SPA
0710E: 03 003 ♥
0710F: C2 194 ┬
07110: 03 003 ♥
07111: CB 203 ╦
07112: 05 005 ♣
07113: 35 053 5
07114: 1F 031 ▼
07115: C3 195 ├
07116: 90 144 É
07117: 90 144 É
07118: 90 144 É
07119: 90 144 É
0711A: 90 144 É
```

```
0700:0106

MOV AL, 057h
MOV DH, 069h
MOV DL, 072h
MOV BX, DX
MOV BH, AL
MOV BL, 09Fh
MOV AH, 020h
ADD AX, DX
ADD CX, BX
ADD AX, 01F35h
RET
NOP
NOP
NOP
NOP
NOP
NOP
NOP
NOP
NOP
NOP
NOP
NOP
NOP
NOP
...
```

original source code

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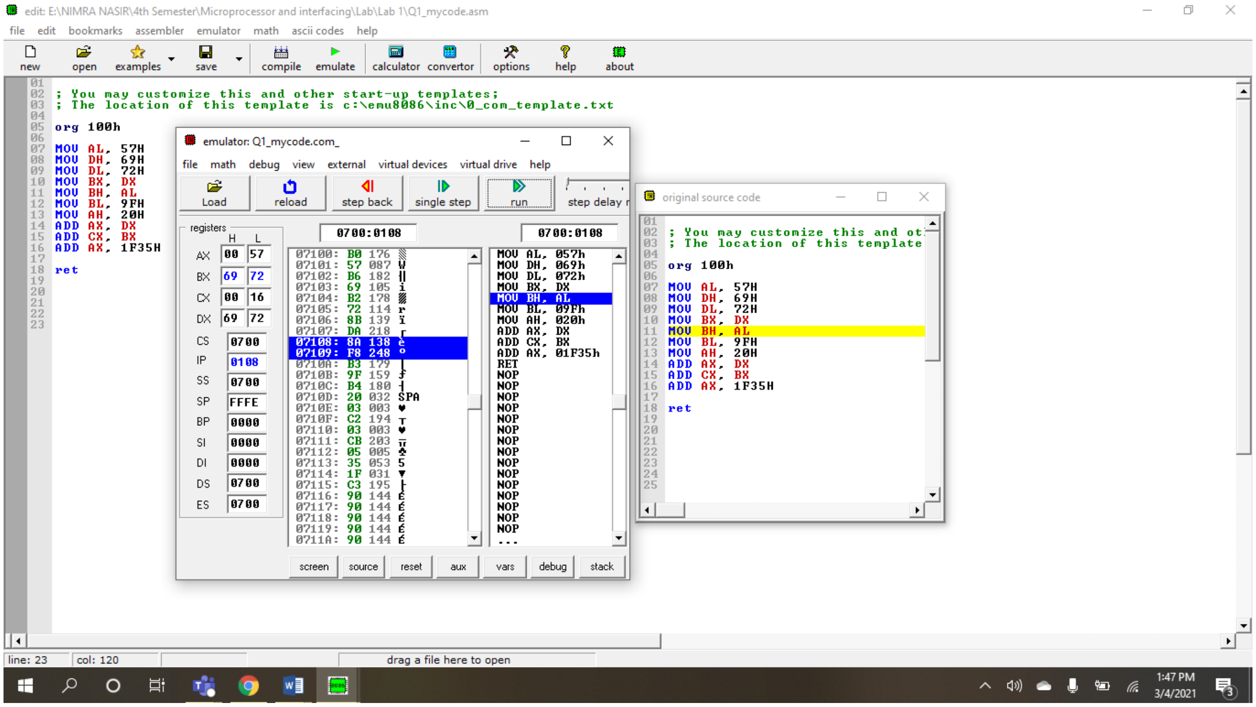
MOV BX, DX

Copy the **DX** register's values to the **BX** register.



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```
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org 100h

MOV AL, 57H
MOV DH, 69H
MOV DL, 72H
MOV BX, DX
MOV BH, AL
MOV BL, 9FH
MOV AH, 20H
ADD AX, DX
ADD CX, BX
ADD AX, 1F35H

ret
```

emulator: Q1_mycode.com_

```
registers
     H   L
AX   00  57
BX   69  72
CX   00  16
DX   69  72
CS   0700
IP   0108
SS   0700
SP   FFFE
BP   0000
SI   0000
DI   0000
DS   0700
ES   0700
```

```
0700:0108                0700:0108
07100: B0 176 ▒          MOV AL, 057h
07101: 57 087 W          MOV DH, 069h
07102: B6 182 ╢          MOV DL, 072h
07103: 69 105 i          MOV BX, DX
07104: B2 178 ▓          MOV BH, AL
07105: 72 114 r          MOV BL, 09Fh
07106: 8B 139 ï          MOV AH, 020h
07107: DA 218 ┌          ADD AX, DX
07108: 8A 138 è          ADD CX, BX
07109: F8 248 °          ADD AX, 01F35h
0710A: B3 179 │          RET
0710B: 9F 159 ƒ          NOP
0710C: B4 180 ┤          NOP
0710D: 20 032 SPA        NOP
0710E: 03 003 ♥          NOP
0710F: C2 194 ┬          NOP
07110: 03 003 ♥          NOP
07111: CB 203 ╦          NOP
07112: 05 005 ♣          NOP
07113: 35 053 5          NOP
07114: 1F 031 ▼          NOP
07115: C3 195 ├          NOP
07116: 90 144 É          NOP
07117: 90 144 É          NOP
07118: 90 144 É          NOP
07119: 90 144 É          NOP
0711A: 90 144 É          ...
```

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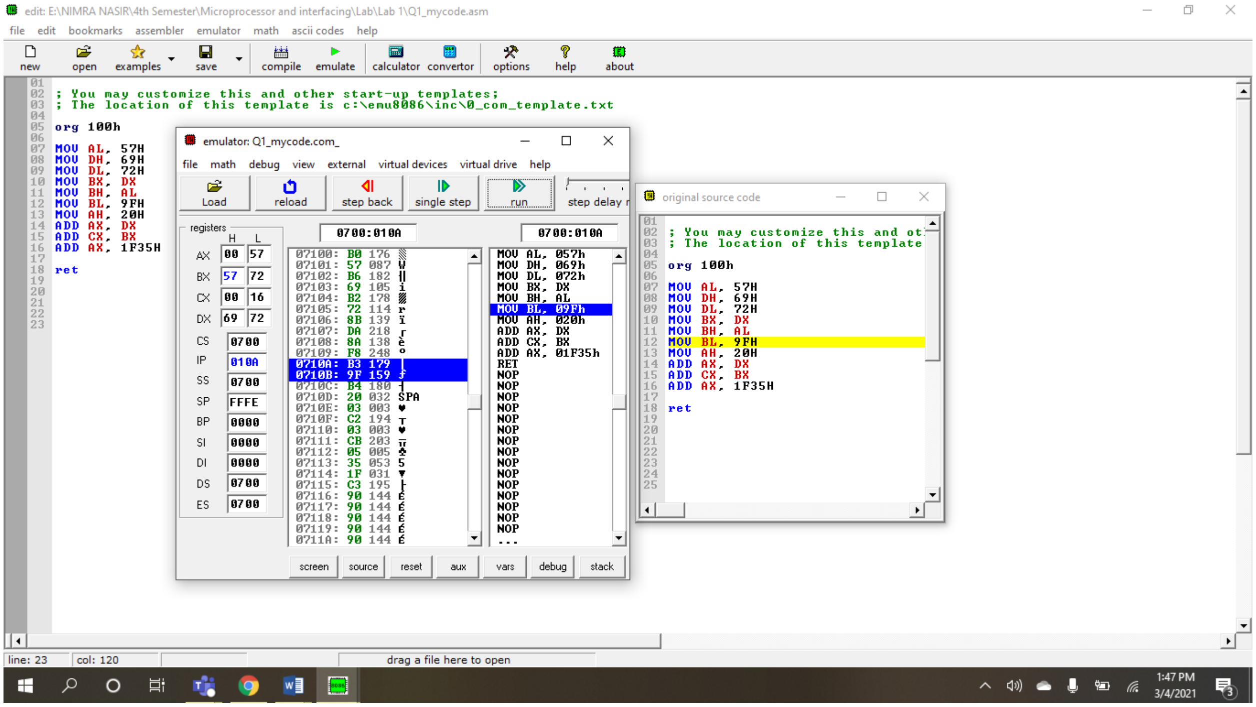
MOV BH, AL

The values of the **lower AX** register would be copied to the **higher BX** register.



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```
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org 100h

MOV AL, 57H
MOV DH, 69H
MOV DL, 72H
MOV BX, DX
MOV BH, AL
MOV BL, 9FH
MOV AH, 20H
ADD AX, DX
ADD CX, BX
ADD AX, 1F35H

ret
```

emulator: Q1_mycode.com_

```
registers
     H   L
AX   00  57
BX   57  72
CX   00  16
DX   69  72
CS   0700
IP   010A
SS   0700
SP   FFFE
BP   0000
SI   0000
DI   0000
DS   0700
ES   0700
```

```
0700:010A                0700:010A
07100: B0 176 ▒          MOV AL, 057h
07101: 57 087 W          MOV DH, 069h
07102: B6 182 ╢          MOV DL, 072h
07103: 69 105 i          MOV BX, DX
07104: B2 178 ▓          MOV BH, AL
07105: 72 114 r          MOV BL, 09Fh
07106: 8B 139 ï          MOV AH, 020h
07107: DA 218 ┌          ADD AX, DX
07108: 8A 138 è          ADD CX, BX
07109: F8 248 °          ADD AX, 01F35h
0710A: B3 179 │          RET
0710B: 9F 159 ƒ          NOP
0710C: B4 180 ┤          NOP
0710D: 20 032 SPA        NOP
0710E: 03 003 ♥          NOP
0710F: C2 194 ┬          NOP
07110: 03 003 ♥          NOP
07111: CB 203 ╦          NOP
07112: 05 005 ♣          NOP
07113: 35 053 5          NOP
07114: 1F 031 ▼          NOP
07115: C3 195 ├          NOP
07116: 90 144 É          NOP
07117: 90 144 É          NOP
07118: 90 144 É          NOP
07119: 90 144 É          NOP
0711A: 90 144 É          ...
```

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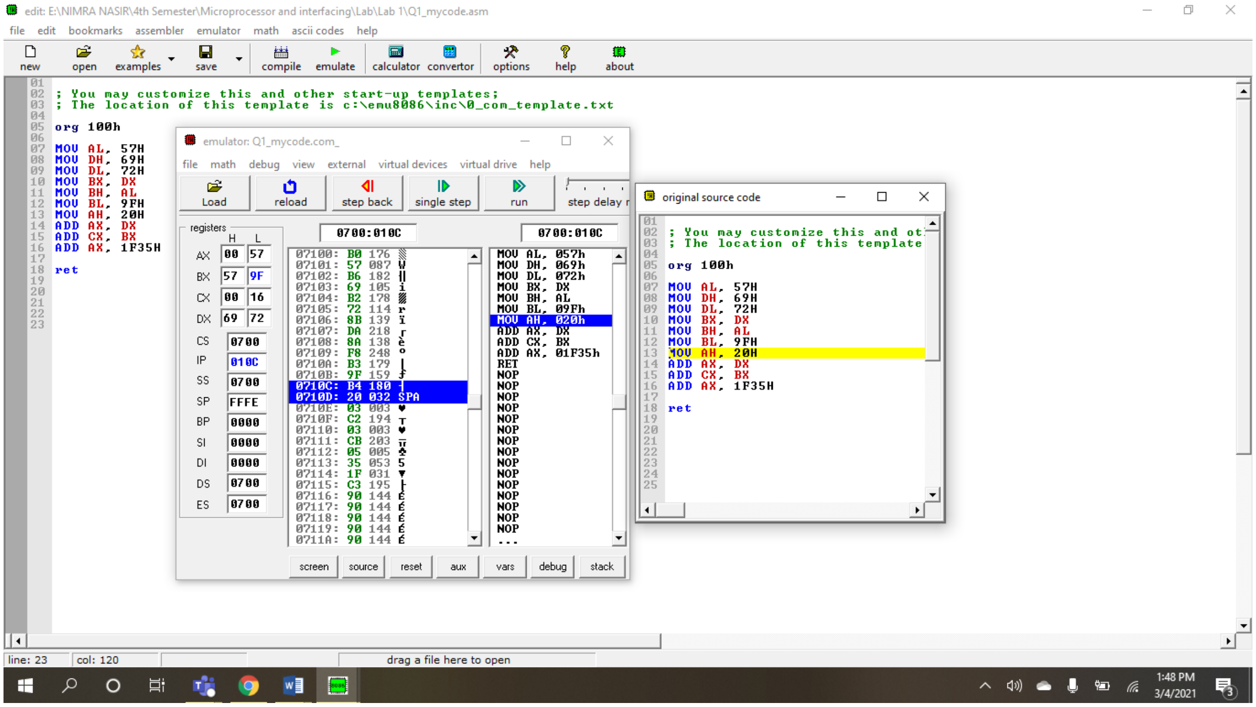
MOV BL, 9FH

The hexadecimal value **9F** will be shifted to the **lower portion** of the **BX** register.



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```
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org 100h

MOV AL, 57H
MOV DH, 69H
MOV DL, 72H
MOV BX, DX
MOV BH, AL
MOV BL, 9FH
MOV AH, 20H
ADD AX, DX
ADD CX, BX
ADD AX, 1F35H

ret
```

emulator: Q1_mycode.com_

registers	H	L
AX	00	57
BX	57	9F
CX	00	16
DX	69	72
CS	0700	
IP	010C	
SS	0700	
SP	FFFE	
BP	0000	
SI	0000	
DI	0000	
DS	0700	
ES	0700	

```
0700:010C

07100: B0 176 ░
07101: 57 087 W
07102: B6 182 ╢
07103: 69 105 i
07104: B2 178 ▓
07105: 72 114 r
07106: 8B 139 ï
07107: DA 218 ┌
07108: 8A 138 è
07109: F8 248 °
0710A: B3 179 │
0710B: 9F 159 ƒ
0710C: B4 180 ┤
0710D: 20 032 SPA
0710E: 03 003 ♥
0710F: C2 194 ┬
07110: 03 003 ♥
07111: CB 203 ╦
07112: 05 005 ♣
07113: 35 053 5
07114: 1F 031 ▼
07115: C3 195 ├
07116: 90 144 É
07117: 90 144 É
07118: 90 144 É
07119: 90 144 É
0711A: 90 144 É
```

```
0700:010C

MOV AL, 057h
MOV DH, 069h
MOV DL, 072h
MOV BX, DX
MOV BH, AL
MOV BL, 09Fh
MOV AH, 020h
ADD AX, DX
ADD CX, BX
ADD AX, 01F35h
RET
NOP
NOP
...
```

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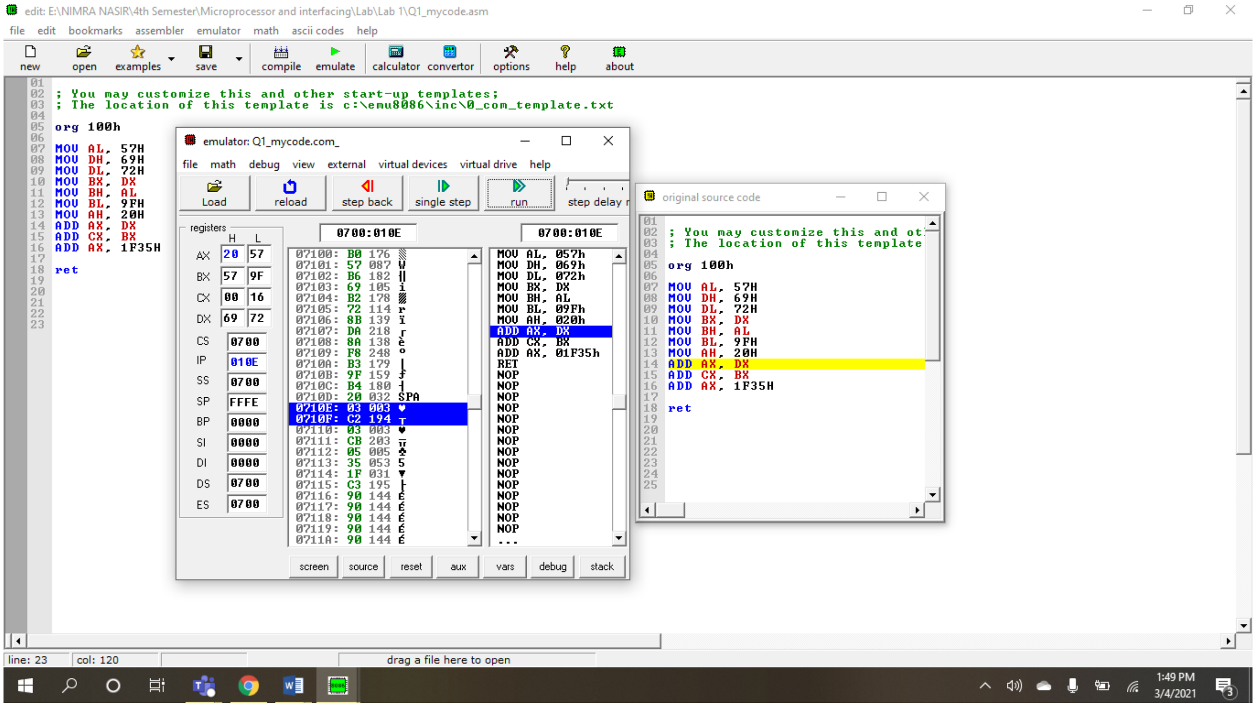
MOV AH, 20H

The hexadecimal value **20** will be moved to the **higher part** of the **AX** register.



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emulator: Q1_mycode.com_

registers	H	L
AX	20	57
BX	57	9F
CX	00	16
DX	69	72
CS	0700	
IP	010E	
SS	0700	
SP	FFFE	
BP	0000	
SI	0000	
DI	0000	
DS	0700	
ES	0700	

```
0700:010E

0710E: 03 003 ♥
0710F: C2 194 ┬
```

```
0700:010E

ADD AX, DX
```

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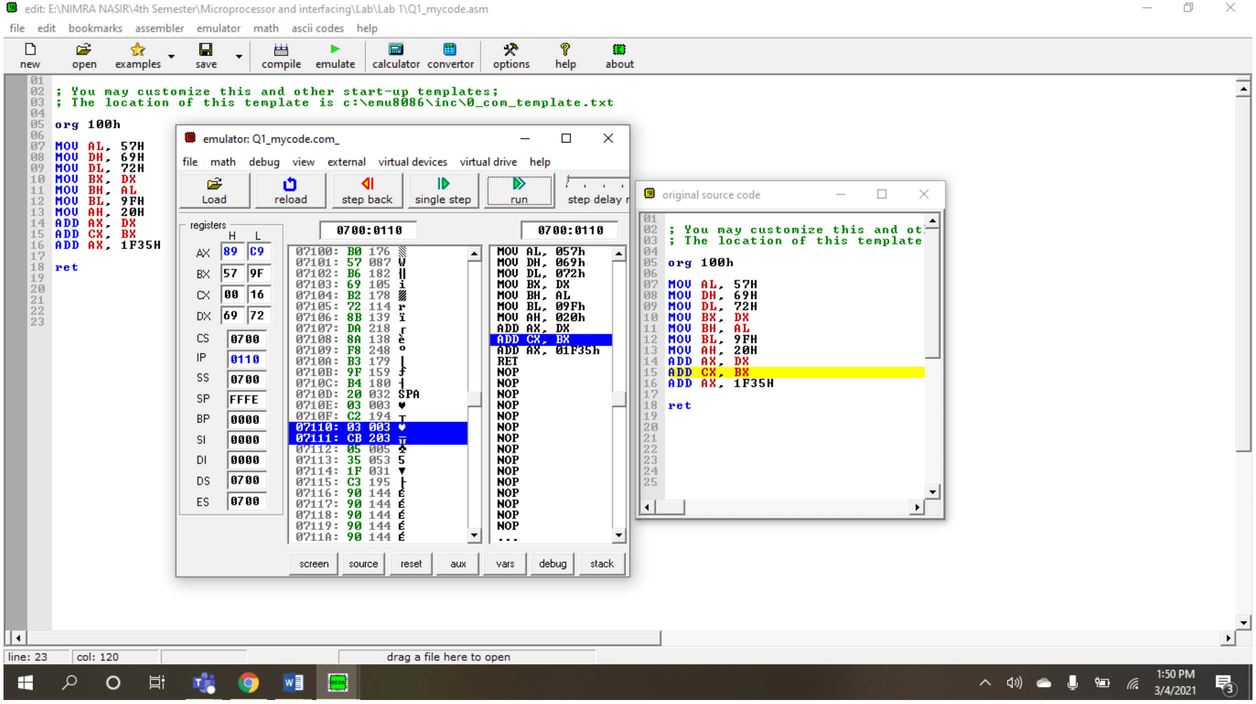
ADD AX, DX

The hexadecimal value of DX lower and higher parts can be added to AX register.



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org 100h

MOV AL, 57H
MOV DH, 69H
MOV DL, 72H
MOV BX, DX
MOV BH, AL
MOV BL, 9FH
MOV AH, 20H
ADD AX, DX
ADD CX, BX
ADD AX, 1F35H

ret
```

emulator: Q1_mycode.com_

```
registers   H   L
AX         89  C9
BX         57  9F
CX         00  16
DX         69  72
CS        0700
IP        0110
SS        0700
SP        FFFE
BP        0000
SI        0000
DI        0000
DS        0700
ES        0700
```

```
0700:0110                  0700:0110
07100: B0 176 ░            MOV AL, 057h
07101: 57 087 W            MOV DH, 069h
07102: B6 182 ╢            MOV DL, 072h
07103: 69 105 i            MOV BX, DX
07104: B2 178 ▓            MOV BH, AL
07105: 72 114 r            MOV BL, 09Fh
07106: 8B 139 ï            MOV AH, 020h
07107: DA 218 ┌            ADD AX, DX
07108: 8A 138 è            ADD CX, BX
07109: F8 248 °            ADD AX, 01F35h
0710A: B3 179 │            RET
0710B: 9F 159 ƒ            NOP
0710C: B4 180 ┤            NOP
0710D: 20 032 SPA          NOP
0710E: 03 003 ♥            NOP
0710F: C2 194 ┬            NOP
07110: 03 003 ♥            NOP
07111: CB 203 ╦            NOP
07112: 05 005 ♣            NOP
07113: 35 053 5            NOP
07114: 1F 031 ▼            NOP
07115: C3 195 ├            NOP
07116: 90 144 É            NOP
07117: 90 144 É            NOP
07118: 90 144 É            NOP
07119: 90 144 É            NOP
0711A: 90 144 É            ...
```

original source code

```
; You may customize this and ot
; The location of this template

org 100h

MOV AL, 57H
MOV DH, 69H
MOV DL, 72H
MOV BX, DX
MOV BH, AL
MOV BL, 9FH
MOV AH, 20H
ADD AX, DX
ADD CX, BX
ADD AX, 1F35H

ret
```

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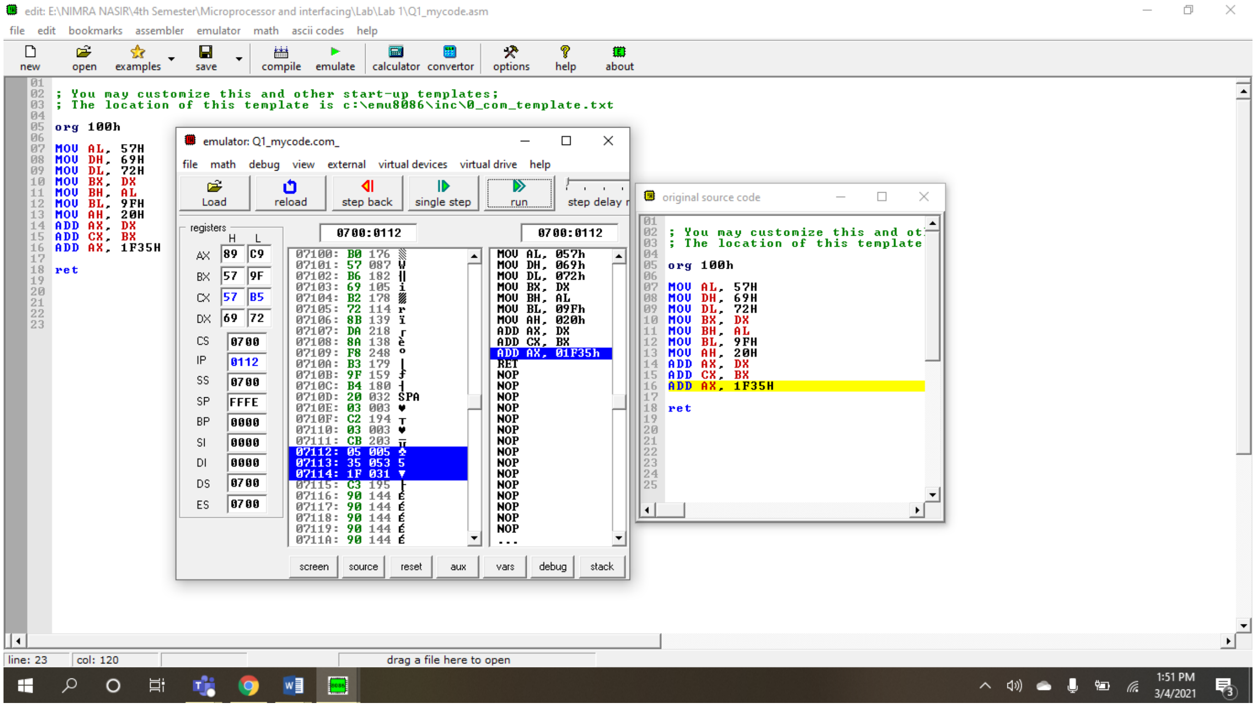
ADD CX, BX

The hexadecimal value of BX lower and higher parts can be added to CX register.



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MOV DH, 69H
MOV DL, 72H
MOV BX, DX
MOV BH, AL
MOV BL, 9FH
MOV AH, 20H
ADD AX, DX
ADD CX, BX
ADD AX, 1F35H

ret
```

emulator: Q1_mycode.com_

```
registers   H   L
AX         89  C9
BX         57  9F
CX         57  B5
DX         69  72
CS        0700
IP        0112
SS        0700
SP        FFFE
BP        0000
SI        0000
DI        0000
DS        0700
ES        0700
```

```
0700:0112                  0700:0112
07100: B0 176 ░            MOV AL, 057h
07101: 57 087 W            MOV DH, 069h
07102: B6 182 ╢            MOV DL, 072h
07103: 69 105 i            MOV BX, DX
07104: B2 178 ▓            MOV BH, AL
07105: 72 114 r            MOV BL, 09Fh
07106: 8B 139 ï            MOV AH, 020h
07107: DA 218 ┌            ADD AX, DX
07108: 8A 138 è            ADD CX, BX
07109: F8 248 °            ADD AX, 01F35h
0710A: B3 179 │            RET
0710B: 9F 159 ƒ            NOP
0710C: B4 180 ┤            NOP
0710D: 20 032 SPA          NOP
0710E: 03 003 ♥            NOP
0710F: C2 194 ┬            NOP
07110: 03 003 ♥            NOP
07111: CB 203 ╦            NOP
07112: 05 005 ♣            NOP
07113: 35 053 5            NOP
07114: 1F 031 ▼            NOP
07115: C3 195 ├            NOP
07116: 90 144 É            NOP
07117: 90 144 É            NOP
07118: 90 144 É            NOP
07119: 90 144 É            NOP
0711A: 90 144 É            ...
```

original source code

```
; You may customize this and ot
; The location of this template

org 100h

MOV AL, 57H
MOV DH, 69H
MOV DL, 72H
MOV BX, DX
MOV BH, AL
MOV BL, 9FH
MOV AH, 20H
ADD AX, DX
ADD CX, BX
ADD AX, 1F35H

ret
```

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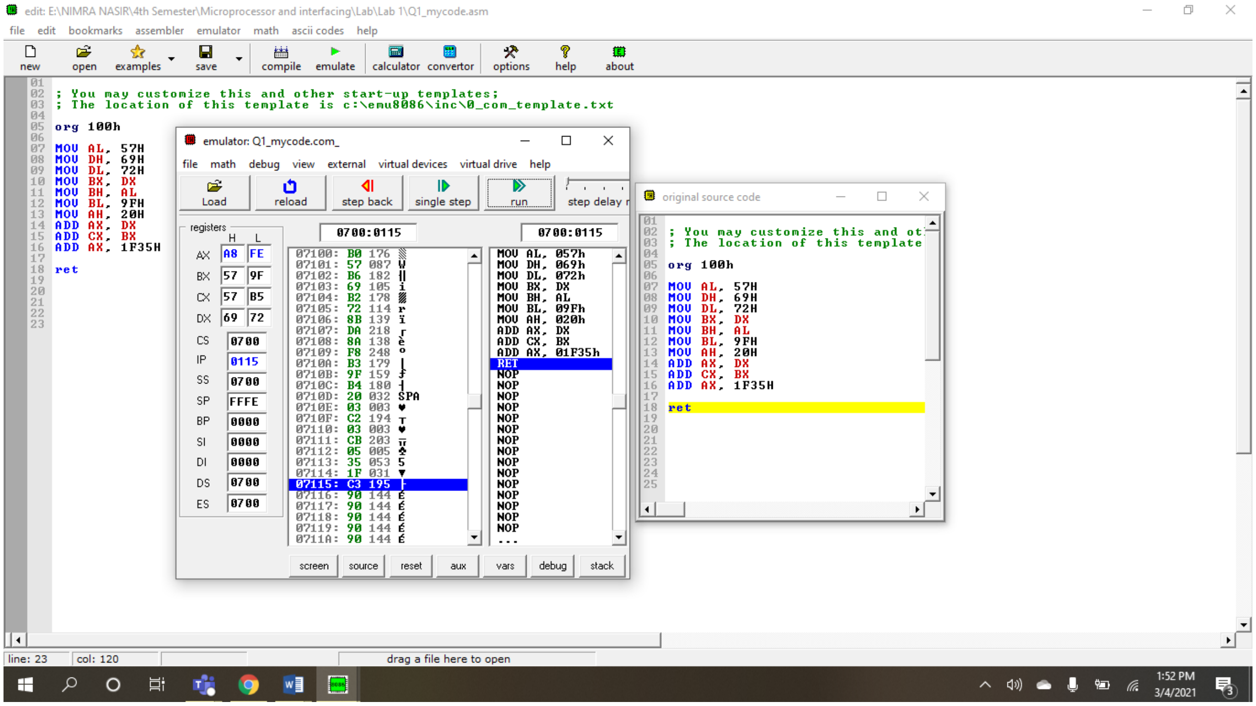
ADD AX, 1F35H

The **AX** register will be shifted with the addition of value **1F35** to it.



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org 100h

MOV AL, 57H
MOV DH, 69H
MOV DL, 72H
MOV BX, DX
MOV BH, AL
MOV BL, 9FH
MOV AH, 20H
ADD AX, DX
ADD CX, BX
ADD AX, 1F35H

ret
```

line: 23 col: 120

registers	H	L
AX	A8	FE
BX	57	9F
CX	57	B5
DX	69	72
CS	0700	
IP	0115	
SS	0700	
SP	FFFE	
BP	0000	
SI	0000	
DI	0000	
DS	0700	
ES	0700	

```
0700:0115
07100: B0 176 ▒
07101: 57 087 W
07102: B6 182 ╢
07103: 69 105 i
07104: B2 178 ▓
07105: 72 114 r
07106: 8B 139 ï
07107: DA 218 ┌
07108: 8A 138 è
07109: F8 248 °
0710A: B3 179 │
0710B: 9F 159 ƒ
0710C: B4 180 ┤
0710D: 20 032 SPA
0710E: 03 003 ♥
0710F: C2 194 ┬
07110: 03 003 ♥
07111: CB 203 ╦
07112: 05 005 ♣
07113: 35 053 5
07114: 1F 031 ▼
07115: C3 195 ├
07116: 90 144 É
07117: 90 144 É
07118: 90 144 É
07119: 90 144 É
0711A: 90 144 É
```

```
0700:0115
MOV AL, 057h
MOV DH, 069h
MOV DL, 072h
MOV BX, DX
MOV BH, AL
MOV BL, 09Fh
MOV AH, 020h
ADD AX, DX
ADD CX, BX
ADD AX, 01F35h
RET
NOP
NOP
NOP
NOP
NOP
NOP
NOP
NOP
NOP
NOP
NOP
NOP
NOP
NOP
NOP
...
```

```
; You may customize this and ot
; The location of this template

org 100h

MOV AL, 57H
MOV DH, 69H
MOV DL, 72H
MOV BX, DX
MOV BH, AL
MOV BL, 9FH
MOV AH, 20H
ADD AX, DX
ADD CX, BX
ADD AX, 1F35H

ret
```

TASK 2:

Write a program to subtract the content of register DX from the content of register AX, then add the result to the content of CX. Set the registers to 4, 0A and 1F respectively.

Solution:

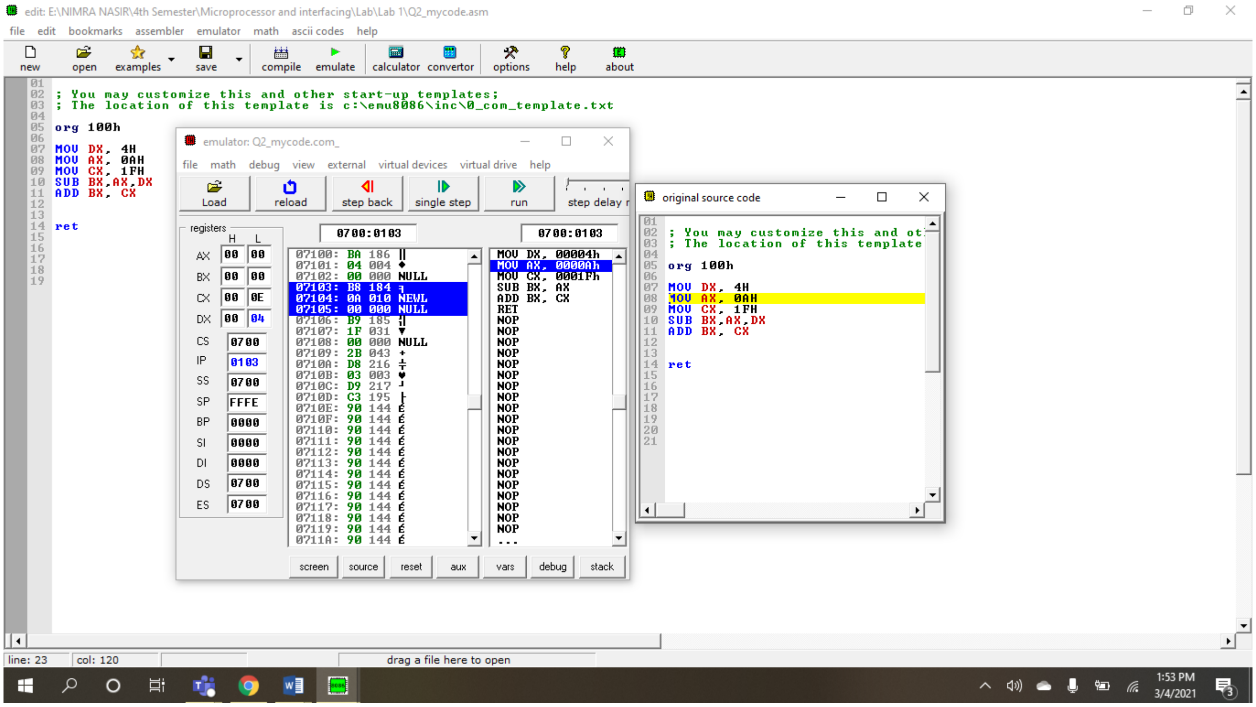
Codes:

```
MOV DX, 04H
MOV AX, 0AH
MOV CX, 1FH
SUB AX, DX
ADD AX, CX
```

Output:

MOV DX, 04H

The hexadecimal value **04** will be shifted to **DX** register.


edit: E:\NIMRA NASIR\4th Semester\Microprocessor and interfacing\Lab\Lab 1\Q2_mycode.asm

```
; You may customize this and other start-up templates;
; The location of this template is c:\emu8086\inc\0_com_template.txt

org 100h

MOV DX, 4H
MOV AX, 0AH
MOV CX, 1FH
SUB BX,AX,DX
ADD BX, CX


ret
```

emulator: Q2_mycode.com_

registers	H	L
AX	00	00
BX	00	00
CX	00	0E
DX	00	04
CS	0700	
IP	0103	
SS	0700	
SP	FFFE	
BP	0000	
SI	0000	
DI	0000	
DS	0700	
ES	0700	

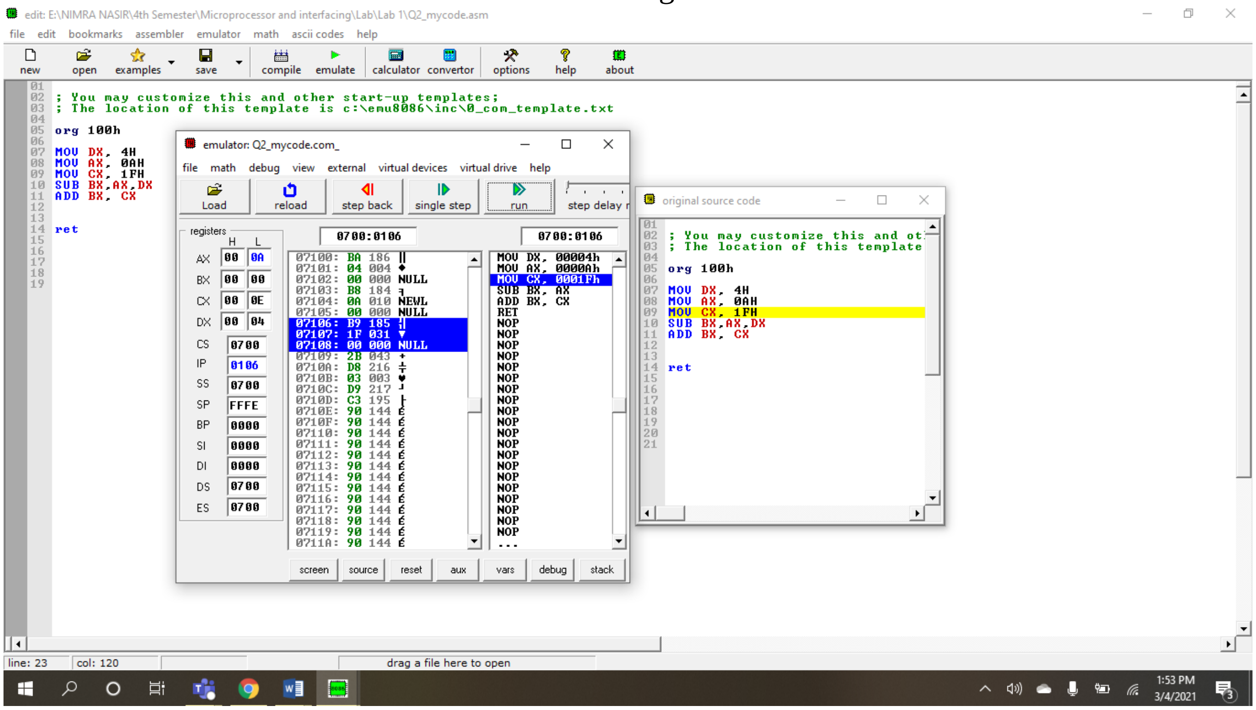
```
0700:0103
07100: BA 186 ╢
07101: 04 004 ♦
07102: 00 000 NULL
07103: B8 184 ╕
07104: 0A 010 NEWL
07105: 00 000 NULL
07106: B9 185 ╣
07107: 1F 031 ▼
07108: 00 000 NULL
07109: 2B 043 +
0710A: D8 216 ╪
0710B: 03 003 ♥
0710C: D9 217 ┘
0710D: C3 195 ├
0710E: 90 144 É
0710F: 90 144 É
07110: 90 144 É
07111: 90 144 É
07112: 90 144 É
07113: 90 144 É
07114: 90 144 É
07115: 90 144 É
07116: 90 144 É
07117: 90 144 É
07118: 90 144 É
07119: 90 144 É
0711A: 90 144 É
```

```
0700:0103
MOV DX, 00004h
MOV AX, 0000Ah
MOV CX, 0001Fh
SUB BX, AX
ADD BX, CX
RET
NOP
...
```

line: 23 col: 120 drag a file here to open

MOV AX, 0AH

The hexadecimal value **0A** will be shifted to **AX** register.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```
; You may customize this and other start-up templates;
; The location of this template is c:\emu8086\inc\0_com_template.txt

org 100h

MOV DX, 4H
MOV AX, 0AH
MOV CX, 1FH
SUB BX,AX,DX
ADD BX, CX


ret
```

emulator: Q2_mycode.com_

registers	H	L
AX	00	0A
BX	00	00
CX	00	0E
DX	00	04
CS	0700	
IP	0106	
SS	0700	
SP	FFFE	
BP	0000	
SI	0000	
DI	0000	
DS	0700	
ES	0700	

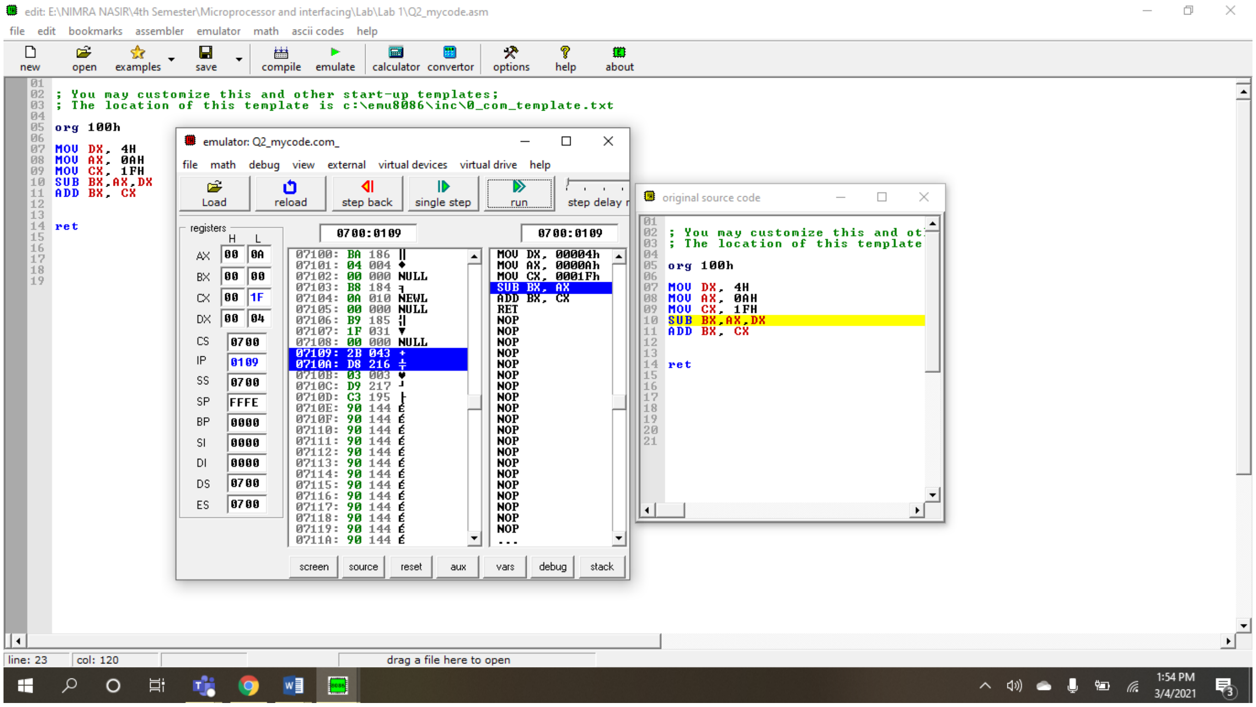
```
0700:0106
07100: BA 186 ╢
07101: 04 004 ♦
07102: 00 000 NULL
07103: B8 184 ╕
07104: 0A 010 NEWL
07105: 00 000 NULL
07106: B9 185 ╣
07107: 1F 031 ▼
07108: 00 000 NULL
07109: 2B 043 +
0710A: D8 216 ╪
0710B: 03 003 ♥
0710C: D9 217 ┘
0710D: C3 195 ├
0710E: 90 144 É
0710F: 90 144 É
07110: 90 144 É
07111: 90 144 É
07112: 90 144 É
07113: 90 144 É
07114: 90 144 É
07115: 90 144 É
07116: 90 144 É
07117: 90 144 É
07118: 90 144 É
07119: 90 144 É
0711A: 90 144 É
```

```
0700:0106
MOV DX, 00004h
MOV AX, 0000Ah
MOV CX, 0001Fh
SUB BX, AX
ADD BX, CX
RET
NOP
...
```

line: 23 col: 120 drag a file here to open

MOV CX, 1FH

The hexadecimal value **1F** will be shifted to **CX** register.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emulator: Q2_mycode.com_
file math debug view external virtual devices virtual drive help
Load reload step back single step run step delay
registers
screen source reset aux vars debug stack
original source code
line: 23 col: 120 drag a file here to open
1:54 PM 3/4/2021

```
; You may customize this and other start-up templates;
; The location of this template is c:\emu8086\inc\0_com_template.txt

org 100h

MOV DX, 4H
MOV AX, 0AH
MOV CX, 1FH
SUB BX,AX,DX
ADD BX, CX

ret
```

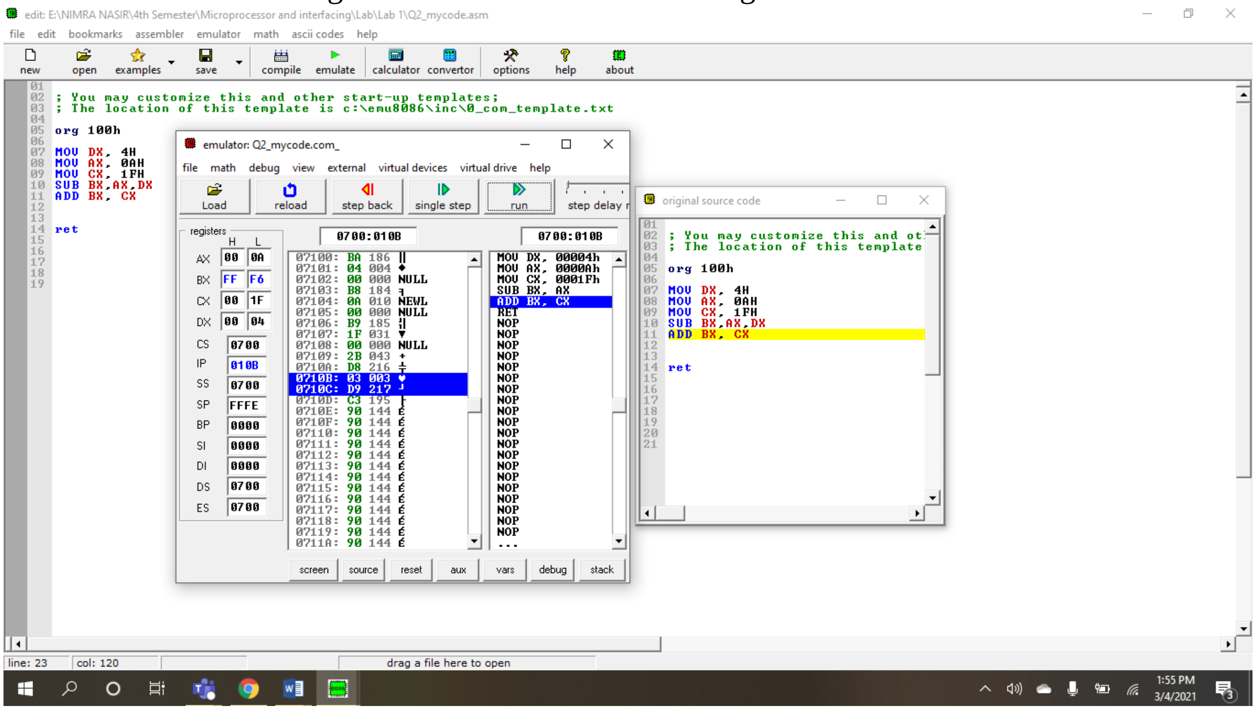
```
registers
     H   L
AX   00  0A
BX   00  00
CX   00  1F
DX   00  04
CS   0700
IP   0109
SS   0700
SP   FFFE
BP   0000
SI   0000
DI   0000
DS   0700
ES   0700
```

```
0700:0109                 0700:0109
07100: BA 186 ╗           MOV DX, 00004h
07101: 04 004 ♦           MOV AX, 0000Ah
07102: 00 000 NULL        MOV CX, 0001Fh
07103: B8 184 ╕           SUB BX, AX
07104: 0A 010 NEWL        ADD BX, CX
07105: 00 000 NULL        RET
07106: B9 185 ╣           NOP
07107: 1F 031 ▼           NOP
07108: 00 000 NULL        NOP
07109: 2B 043 +           NOP
0710A: D8 216 ╪           NOP
0710B: 03 003 ♥           NOP
0710C: D9 217 ┘           NOP
0710D: C3 195 ├           NOP
0710E: 90 144 É           NOP
0710F: 90 144 É           NOP
07110: 90 144 É           NOP
07111: 90 144 É           NOP
07112: 90 144 É           NOP
07113: 90 144 É           NOP
07114: 90 144 É           NOP
07115: 90 144 É           NOP
07116: 90 144 É           NOP
07117: 90 144 É           NOP
07118: 90 144 É           NOP
07119: 90 144 É           NOP
0711A: 90 144 É           ...
```

```
; You may customize this and ot
; The location of this template

org 100h

MOV DX, 4H
MOV AX, 0AH
MOV CX, 1FH
SUB BX,AX,DX
ADD BX, CX

ret
```

SUB AX, DX

Subtract the content of register DX from the content of register AX.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Load reload step back single step run step delay
registers
screen source reset aux vars debug stack
original source code
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```
; You may customize this and other start-up templates;
; The location of this template is c:\emu8086\inc\0_com_template.txt

org 100h

MOV DX, 4H
MOV AX, 0AH
MOV CX, 1FH
SUB BX,AX,DX
ADD BX, CX

ret
```

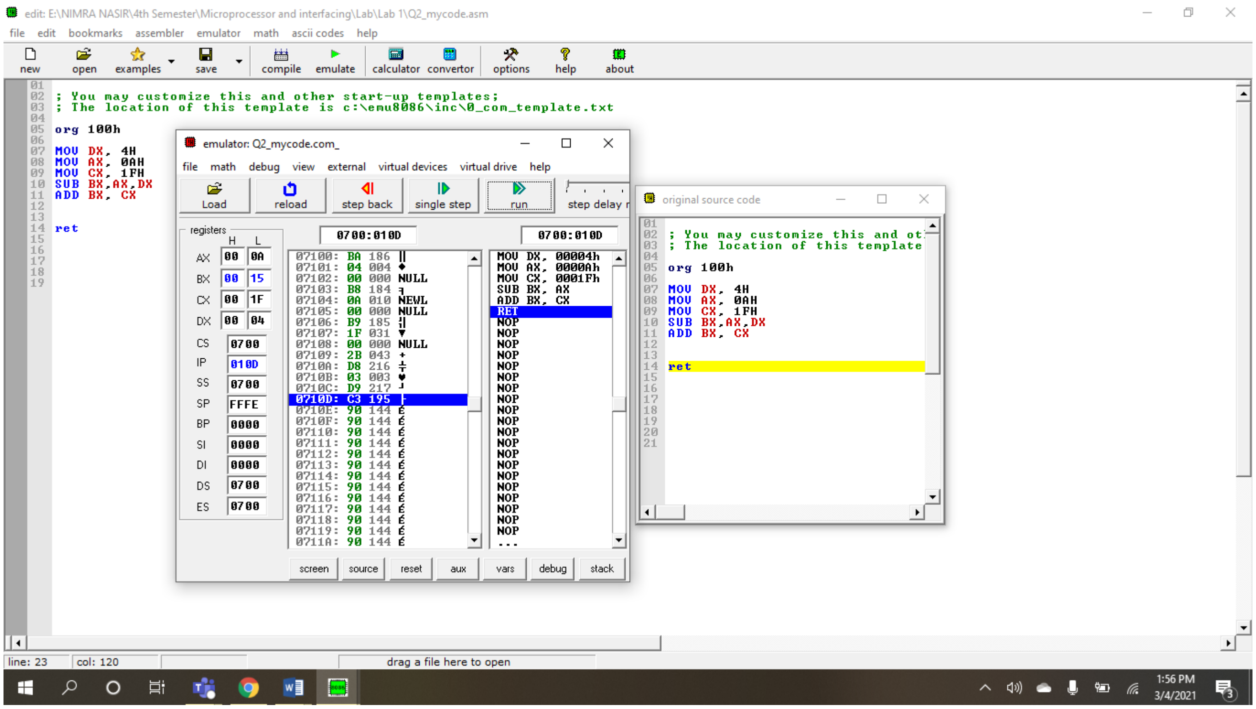
```
registers
     H   L
AX   00  0A
BX   FF  F6
CX   00  1F
DX   00  04
CS   0700
IP   010B
SS   0700
SP   FFFE
BP   0000
SI   0000
DI   0000
DS   0700
ES   0700
```

```
0700:010B                 0700:010B
07100: BA 186 ╗           MOV DX, 00004h
07101: 04 004 ♦           MOV AX, 0000Ah
07102: 00 000 NULL        MOV CX, 0001Fh
07103: B8 184 ╕           SUB BX, AX
07104: 0A 010 NEWL        ADD BX, CX
07105: 00 000 NULL        RET
07106: B9 185 ╣           NOP
07107: 1F 031 ▼           NOP
07108: 00 000 NULL        NOP
07109: 2B 043 +           NOP
0710A: D8 216 ╪           NOP
0710B: 03 003 ♥           NOP
0710C: D9 217 ┘           NOP
0710D: C3 195 ├           NOP
0710E: 90 144 É           NOP
0710F: 90 144 É           NOP
07110: 90 144 É           NOP
07111: 90 144 É           NOP
07112: 90 144 É           NOP
07113: 90 144 É           NOP
07114: 90 144 É           NOP
07115: 90 144 É           NOP
07116: 90 144 É           NOP
07117: 90 144 É           NOP
07118: 90 144 É           NOP
07119: 90 144 É           NOP
0711A: 90 144 É           ...
```

```
; You may customize this and ot
; The location of this template

org 100h

MOV DX, 4H
MOV AX, 0AH
MOV CX, 1FH
SUB BX,AX,DX
ADD BX, CX

ret
```

ADD AX, CX

Add the content of CX to AX.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```
; You may customize this and other start-up templates;
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org 100h

MOV DX, 4H
MOV AX, 0AH
MOV CX, 1FH
SUB BX,AX,DX
ADD BX, CX


ret
```

registers	H	L
AX	00	0A
BX	00	15
CX	00	1F
DX	00	04
CS	0700	
IP	010D	
SS	0700	
SP	FFFE	
BP	0000	
SI	0000	
DI	0000	
DS	0700	
ES	0700	

```
0700:010D

07100: BA 186 ║
07101: 04 004 ♦
07102: 00 000 NULL
07103: B8 184 ╕
07104: 0A 010 NEWL
07105: 00 000 NULL
07106: B9 185 ╣
07107: 1F 031 ▼
07108: 00 000 NULL
07109: 2B 043 +
0710A: D8 216 ╪
0710B: 03 003 ♥
0710C: D9 217 ┘
0710D: C3 195 ├
0710E: 90 144 É
0710F: 90 144 É
07110: 90 144 É
07111: 90 144 É
07112: 90 144 É
07113: 90 144 É
07114: 90 144 É
07115: 90 144 É
07116: 90 144 É
07117: 90 144 É
07118: 90 144 É
07119: 90 144 É
0711A: 90 144 É
```

```
0700:010D

MOV DX, 00004h
MOV AX, 0000Ah
MOV CX, 0001Fh
SUB BX, AX
ADD BX, CX
RET
NOP
NOP
NOP
NOP
NOP
NOP
NOP
NOP
NOP
NOP
NOP
NOP
NOP
NOP
NOP
NOP
NOP
NOP
NOP
NOP
...
```

```
; You may customize this and ot
; The location of this template

org 100h

MOV DX, 4H
MOV AX, 0AH
MOV CX, 1FH
SUB BX,AX,DX
ADD BX, CX


ret
```

TASK 3:

Add three binary numbers to get the result of 30 in assembly ?

Solution:

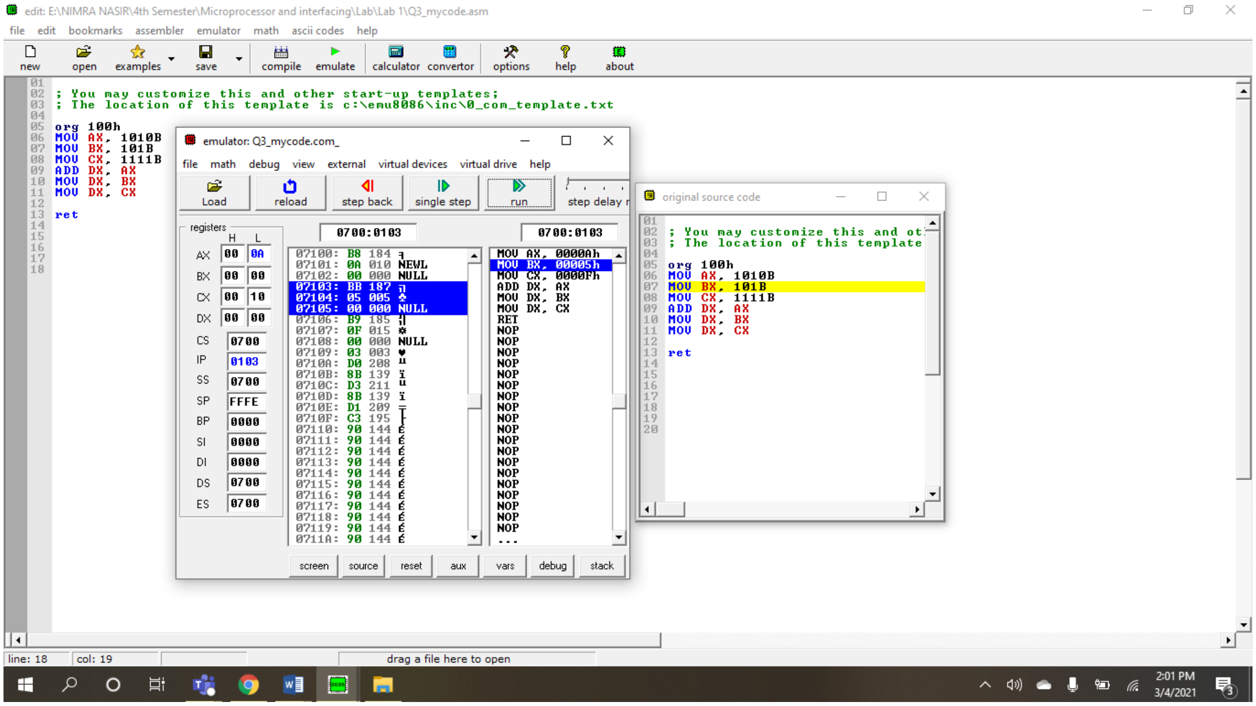
Codes:

```
MOV AX, 1010B
MOV BX, 101B
MOV CX, 1111B
ADD DX, AX
MOV DX, BX
MOV DX, CX
```

Output:

MOV AX, 1010B

Move binary value 1010 in AX register.



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```
; You may customize this and other start-up templates;
; The location of this template is c:\emu8086\inc\0_com_template.txt

org 100h
MOV AX, 1010B
MOV BX, 101B
MOV CX, 1111B
ADD DX, AX
MOV DX, BX
MOV DX, CX

ret
```

emulator: Q3_mycode.com_

```
registers  H  L
AX        00 0A
BX        00 00
CX        00 10
DX        00 00
CS        0700
IP        0103
SS        0700
SP        FFFE
BP        0000
SI        0000
DI        0000
DS        0700
ES        0700
```

```
0700:0103

07100: B8 184 ╕
07101: 0A 010 NEWL
07102: 00 000 NULL
07103: BB 187 ╗
07104: 05 005 ♣
07105: 00 000 NULL
07106: B9 185 ╣
07107: 0F 015 ☼
07108: 00 000 NULL
07109: 03 003 ♥
0710A: D0 208 ╨
0710B: 8B 139 ï
0710C: D3 211 ╙
0710D: 8B 139 ï
0710E: D1 209 ╤
0710F: C3 195 ├
07110: 90 144 É
07111: 90 144 É
07112: 90 144 É
07113: 90 144 É
07114: 90 144 É
07115: 90 144 É
07116: 90 144 É
07117: 90 144 É
07118: 90 144 É
07119: 90 144 É
0711A: 90 144 É
```

```
0700:0103

MOV AX, 0000Ah
MOV BX, 00005h
MOV CX, 0000Fh
ADD DX, AX
MOV DX, BX
MOV DX, CX
RET
NOP
NOP
NOP
NOP
NOP
NOP
NOP
NOP
NOP
NOP
NOP
NOP
NOP
NOP
NOP
NOP
NOP
NOP
NOP
...
```

original source code

```
; You may customize this and ot
; The location of this template

org 100h
MOV AX, 1010B
MOV BX, 101B
MOV CX, 1111B
ADD DX, AX
MOV DX, BX
MOV DX, CX

ret
```

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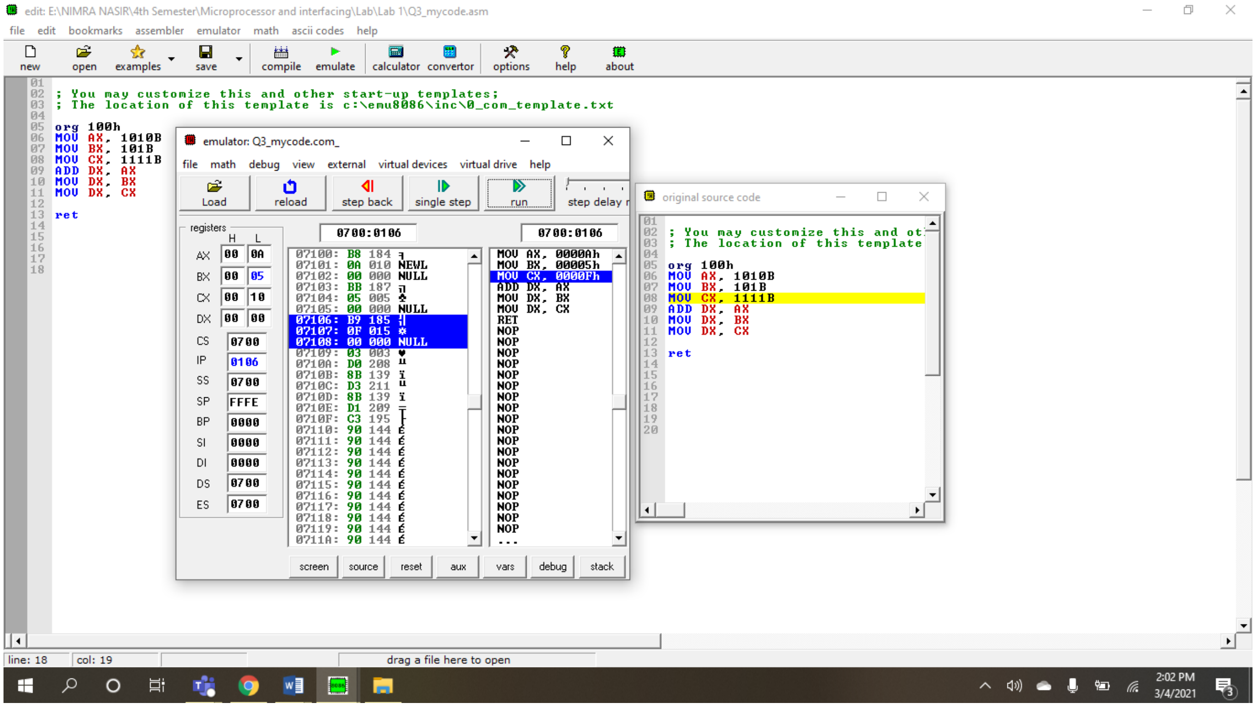
MOV BX, 101B

Move binary value 101 in BX register.



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```
; You may customize this and other start-up templates;
; The location of this template is c:\emu8086\inc\0_com_template.txt

org 100h
MOV AX, 1010B
MOV BX, 101B
MOV CX, 1111B
ADD DX, AX
MOV DX, BX
MOV DX, CX

ret
```

emulator: Q3_mycode.com_

```
registers  H  L
AX        00 0A
BX        00 05
CX        00 10
DX        00 00
CS        0700
IP        0106
SS        0700
SP        FFFE
BP        0000
SI        0000
DI        0000
DS        0700
ES        0700
```

```
0700:0106

07100: B8 184 ╕
07101: 0A 010 NEWL
07102: 00 000 NULL
07103: BB 187 ╗
07104: 05 005 ♣
07105: 00 000 NULL
07106: B9 185 ╣
07107: 0F 015 ☼
07108: 00 000 NULL
07109: 03 003 ♥
0710A: D0 208 ╨
0710B: 8B 139 ï
0710C: D3 211 ╙
0710D: 8B 139 ï
0710E: D1 209 ╤
0710F: C3 195 ├
07110: 90 144 É
07111: 90 144 É
07112: 90 144 É
07113: 90 144 É
07114: 90 144 É
07115: 90 144 É
07116: 90 144 É
07117: 90 144 É
07118: 90 144 É
07119: 90 144 É
0711A: 90 144 É
```

```
0700:0106

MOV AX, 0000Ah
MOV BX, 00005h
MOV CX, 0000Fh
ADD DX, AX
MOV DX, BX
MOV DX, CX
RET
NOP
NOP
NOP
NOP
NOP
NOP
NOP
NOP
NOP
NOP
NOP
NOP
NOP
NOP
NOP
NOP
NOP
NOP
NOP
...
```

original source code

```
; You may customize this and ot
; The location of this template

org 100h
MOV AX, 1010B
MOV BX, 101B
MOV CX, 1111B
ADD DX, AX
MOV DX, BX
MOV DX, CX

ret
```

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2:02 PM 3/4/2021

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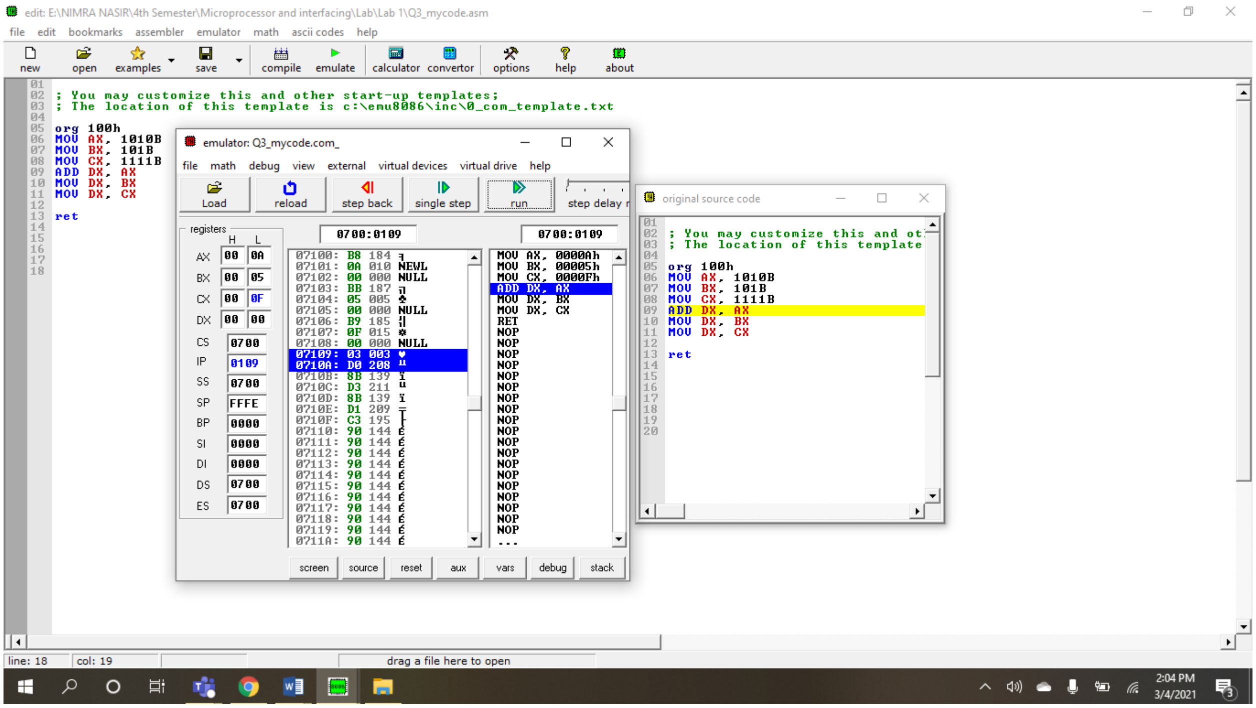
MOV CX, 1111B

Move binary value 1111 in CX register.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Load reload step back single step run step delay
original source code
screen source reset aux vars debug stack
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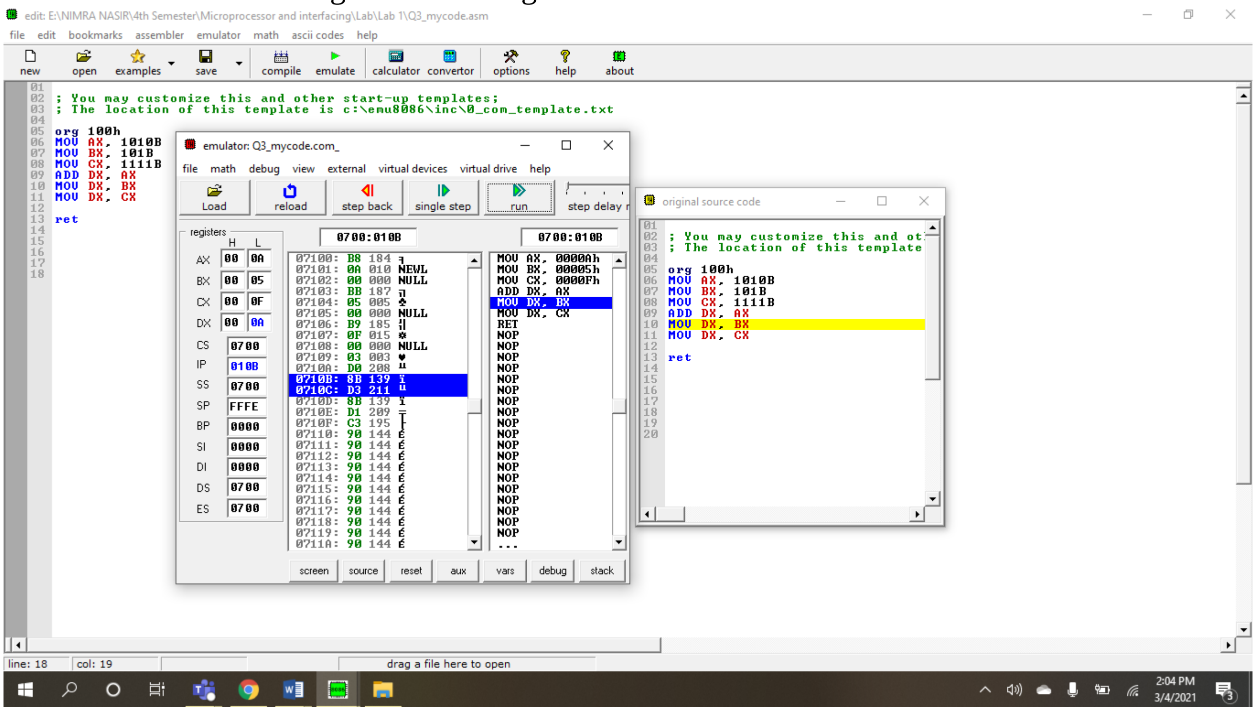
```
; You may customize this and other start-up templates;
; The location of this template is c:\emu8086\inc\0_com_template.txt

org 100h
MOV AX, 1010B
MOV BX, 101B
MOV CX, 1111B
ADD DX, AX
MOV DX, BX
MOV DX, CX

ret
```

```
registers
     H   L
AX   00  0A
BX   00  05
CX   00  0F
DX   00  00
CS   0700
IP   0109
SS   0700
SP   FFFE
BP   0000
SI   0000
DI   0000
DS   0700
ES   0700
```

```
0700:0109                     0700:0109
07100: B8 184 ╕               MOV AX, 0000Ah
07101: 0A 010 NEWL            MOV BX, 00005h
07102: 00 000 NULL            MOV CX, 0000Fh
07103: BB 187 ╗               ADD DX, AX
07104: 05 005 ♣               MOV DX, BX
07105: 00 000 NULL            MOV DX, CX
07106: B9 185 ╣               RET
07107: 0F 015 ☼               NOP
07108: 00 000 NULL            NOP
07109: 03 003 ♥               NOP
0710A: D0 208 ╨               NOP
0710B: 8B 139 ï               NOP
0710C: D3 211 ╙               NOP
0710D: 8B 139 ï               NOP
0710E: D1 209 ╤               NOP
0710F: C3 195 ├               NOP
07110: 90 144 É               NOP
07111: 90 144 É               NOP
07112: 90 144 É               NOP
07113: 90 144 É               NOP
07114: 90 144 É               NOP
07115: 90 144 É               NOP
07116: 90 144 É               NOP
07117: 90 144 É               NOP
07118: 90 144 É               NOP
07119: 90 144 É               NOP
0711A: 90 144 É               ...
```

ADD DX, AX

Add the content of AX register to DX register.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Load reload step back single step run step delay
original source code
screen source reset aux vars debug stack
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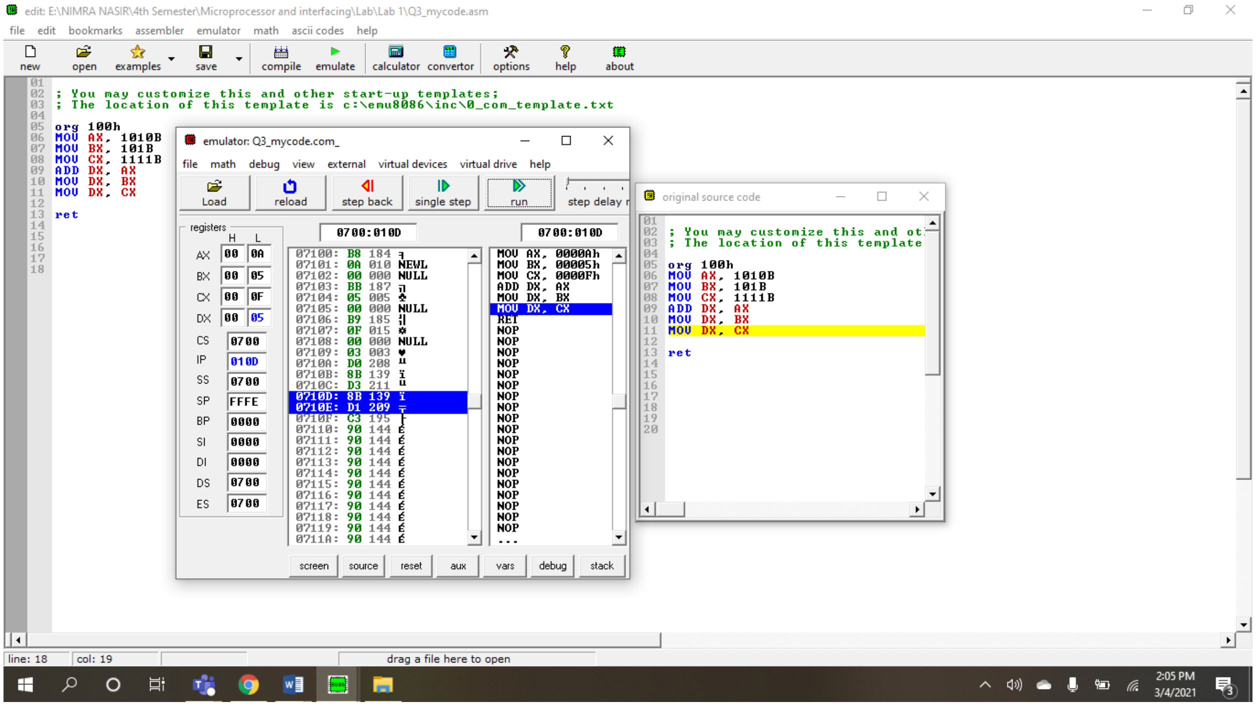
```
; You may customize this and other start-up templates;
; The location of this template is c:\emu8086\inc\0_com_template.txt

org 100h
MOV AX, 1010B
MOV BX, 101B
MOV CX, 1111B
ADD DX, AX
MOV DX, BX
MOV DX, CX

ret
```

```
registers
     H   L
AX   00  0A
BX   00  05
CX   00  0F
DX   00  0A
CS   0700
IP   010B
SS   0700
SP   FFFE
BP   0000
SI   0000
DI   0000
DS   0700
ES   0700
```

```
0700:010B                     0700:010B
07100: B8 184 ╕               MOV AX, 0000Ah
07101: 0A 010 NEWL            MOV BX, 00005h
07102: 00 000 NULL            MOV CX, 0000Fh
07103: BB 187 ╗               ADD DX, AX
07104: 05 005 ♣               MOV DX, BX
07105: 00 000 NULL            MOV DX, CX
07106: B9 185 ╣               RET
07107: 0F 015 ☼               NOP
07108: 00 000 NULL            NOP
07109: 03 003 ♥               NOP
0710A: D0 208 ╨               NOP
0710B: 8B 139 ï               NOP
0710C: D3 211 ╙               NOP
0710D: 8B 139 ï               NOP
0710E: D1 209 ╤               NOP
0710F: C3 195 ├               NOP
07110: 90 144 É               NOP
07111: 90 144 É               NOP
07112: 90 144 É               NOP
07113: 90 144 É               NOP
07114: 90 144 É               NOP
07115: 90 144 É               NOP
07116: 90 144 É               NOP
07117: 90 144 É               NOP
07118: 90 144 É               NOP
07119: 90 144 É               NOP
0711A: 90 144 É               ...
```

MOV DX, BX

Move the content of BX register to DX register.


edit: E:\NIMRA NASIR\4th Semester\Microprocessor and interfacing\Lab\Lab 1\Q3_mycode.asm
file edit bookmarks assembler emulator math ascii codes help
new open examples save compile emulate calculator convertor options help about
emulator: Q3_mycode.com_
file math debug view external virtual devices virtual drive help
Load reload step back single step run step delay
screen source reset aux vars debug stack
original source code
line: 18 col: 19
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3/4/2021

```
; You may customize this and other start-up templates;
; The location of this template is c:\emu8086\inc\0_com_template.txt

org 100h
MOV AX, 1010B
MOV BX, 101B
MOV CX, 1111B
ADD DX, AX
MOV DX, BX
MOV DX, CX

ret
```

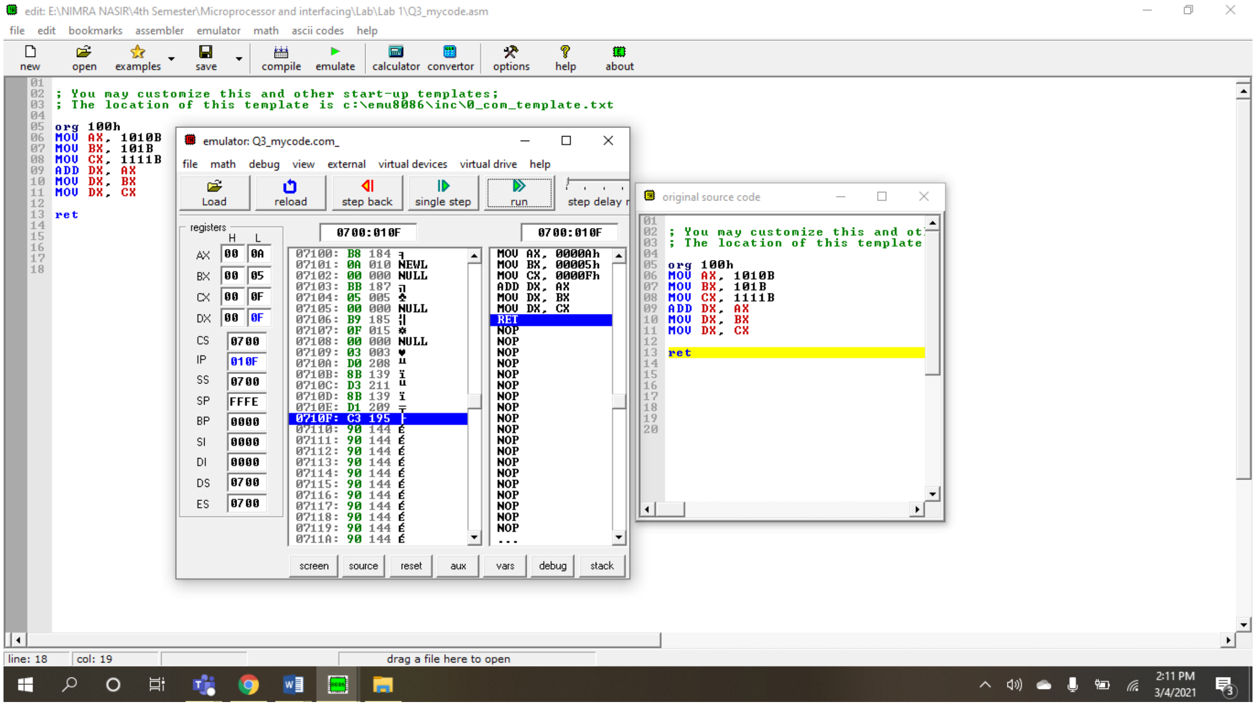
registers	H	L
AX	00	0A
BX	00	05
CX	00	0F
DX	00	05
CS	0700	
IP	010D	
SS	0700	
SP	FFFE	
BP	0000	
SI	0000	
DI	0000	
DS	0700	
ES	0700	

```
0700:010D

07100: B8 184 ╕
07101: 0A 010 NEWL
07102: 00 000 NULL
07103: BB 187 ╗
07104: 05 005 ♣
07105: 00 000 NULL
07106: B9 185 ╣
07107: 0F 015 ☼
07108: 00 000 NULL
07109: 03 003 ♥
0710A: D0 208 ╨
0710B: 8B 139 ï
0710C: D3 211 ╙
0710D: 8B 139 ï
0710E: D1 209 ╤
0710F: C3 195 ├
07110: 90 144 É
07111: 90 144 É
07112: 90 144 É
07113: 90 144 É
07114: 90 144 É
07115: 90 144 É
07116: 90 144 É
07117: 90 144 É
07118: 90 144 É
07119: 90 144 É
0711A: 90 144 É
```

```
0700:010D

MOV AX, 0000Ah
MOV BX, 00005h
MOV CX, 0000Fh
ADD DX, AX
MOV DX, BX
MOV DX, CX
RET
NOP
NOP
NOP
NOP
NOP
NOP
NOP
NOP
NOP
NOP
NOP
NOP
NOP
NOP
NOP
NOP
NOP
NOP
NOP
...
```

MOV DX, CX

Move the content of CX register to DX register.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emulator: Q3_mycode.com_
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Load reload step back single step run step delay
screen source reset aux vars debug stack
original source code
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3/4/2021

```
; You may customize this and other start-up templates;
; The location of this template is c:\emu8086\inc\0_com_template.txt

org 100h
MOV AX, 1010B
MOV BX, 101B
MOV CX, 1111B
ADD DX, AX
MOV DX, BX
MOV DX, CX

ret
```

registers	H	L
AX	00	0A
BX	00	05
CX	00	0F
DX	00	0F
CS	0700	
IP	010F	
SS	0700	
SP	FFFE	
BP	0000	
SI	0000	
DI	0000	
DS	0700	
ES	0700	

```
0700:010F

07100: B8 184 ╕
07101: 0A 010 NEWL
07102: 00 000 NULL
07103: BB 187 ╗
07104: 05 005 ♣
07105: 00 000 NULL
07106: B9 185 ╣
07107: 0F 015 ☼
07108: 00 000 NULL
07109: 03 003 ♥
0710A: D0 208 ╨
0710B: 8B 139 ï
0710C: D3 211 ╙
0710D: 8B 139 ï
0710E: D1 209 ╤
0710F: C3 195 ├
07110: 90 144 É
07111: 90 144 É
07112: 90 144 É
07113: 90 144 É
07114: 90 144 É
07115: 90 144 É
07116: 90 144 É
07117: 90 144 É
07118: 90 144 É
07119: 90 144 É
0711A: 90 144 É
```

```
0700:010F

MOV AX, 0000Ah
MOV BX, 00005h
MOV CX, 0000Fh
ADD DX, AX
MOV DX, BX
MOV DX, CX
RET
NOP
NOP
NOP
NOP
NOP
NOP
NOP
NOP
NOP
NOP
NOP
NOP
NOP
NOP
NOP
NOP
NOP
NOP
NOP
...
```

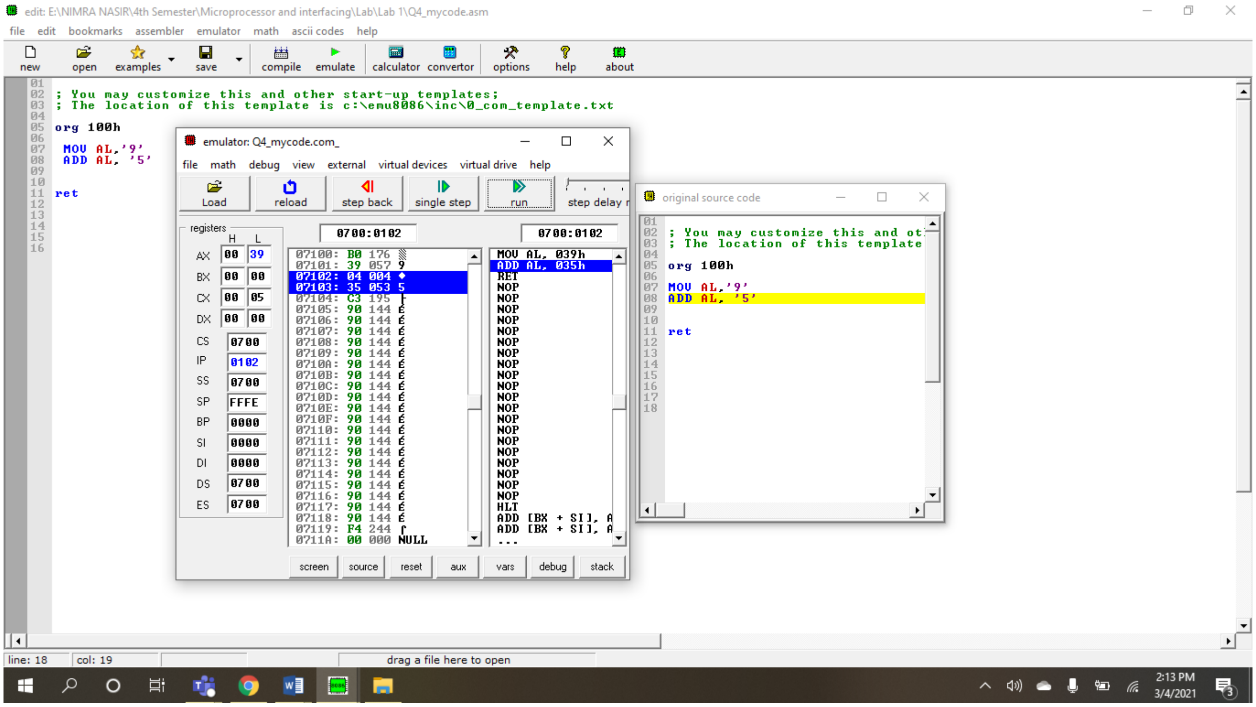
TASK 4:

MOV AL, ‘9’
ADD AL, ‘5’
Have a close look at results?

Solution:

MOV AL, ‘9’

The ASCII hexadecimal code of **9** is **39** which can be shifted to the **lower part** of **AX** register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emulator: Q4_mycode.com_
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Load reload step back single step run step delay
registers
screen source reset aux vars debug stack
original source code
line: 18
col: 19
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```
; You may customize this and other start-up templates;
; The location of this template is c:\emu8086\inc\0_com_template.txt

org 100h

 MOV AL,'9'
 ADD AL, '5'


ret
```

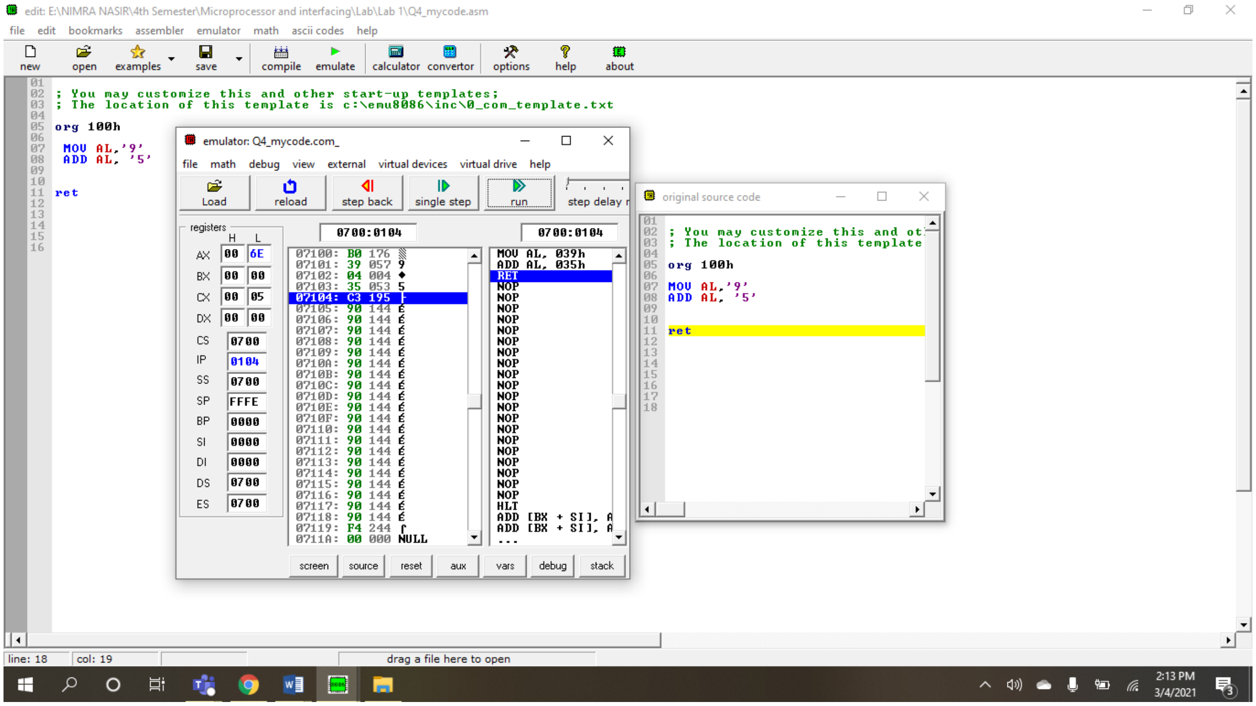
```
      H   L
AX   00  39
BX   00  00
CX   00  05
DX   00  00
CS   0700
IP   0102
SS   0700
SP   FFFE
BP   0000
SI   0000
DI   0000
DS   0700
ES   0700
```

```
0700:0102                      0700:0102

07100: B0 176 ░                MOV AL, 039h
07101: 39 057 9                ADD AL, 035h
07102: 04 004 ♦                RET
07103: 35 053 5                NOP
07104: C3 195 ├                NOP
07105: 90 144 É                NOP
07106: 90 144 É                NOP
07107: 90 144 É                NOP
07108: 90 144 É                NOP
07109: 90 144 É                NOP
0710A: 90 144 É                NOP
0710B: 90 144 É                NOP
0710C: 90 144 É                NOP
0710D: 90 144 É                NOP
0710E: 90 144 É                NOP
0710F: 90 144 É                NOP
07110: 90 144 É                NOP
07111: 90 144 É                NOP
07112: 90 144 É                NOP
07113: 90 144 É                NOP
07114: 90 144 É                NOP
07115: 90 144 É                NOP
07116: 90 144 É                HLT
07117: 90 144 É                ADD [BX + SI], A
07118: 90 144 É                ADD [BX + SI], A
07119: F4 244 ſ                ...
0711A: 00 000 NULL
```

```
; You may customize this and ot
; The location of this template

org 100h

MOV AL,'9'
ADD AL, '5'


ret
```

ADD AL, ‘5’

The ASCII hexadecimal code of **5** is **35** which can be added to **the lower part** of **AX** register.



edit: E:\NIMRA NASIR\4th Semester\Microprocessor and interfacing\Lab\Lab 1\Q4_mycode.asm

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new
open
examples
save
compile
emulate
calculator
convertor
options
help
about

```
; You may customize this and other start-up templates;
; The location of this template is c:\emu8086\inc\0_com_template.txt

org 100h

 MOV AL,'9'
 ADD AL, '5'


ret
```

emulator: Q4_mycode.com_

file math debug view external virtual devices virtual drive help
Load
reload
step back
single step
run
step delay

registers

	H	L
AX	00	6E
BX	00	00
CX	00	05
DX	00	00
CS	0700	
IP	0104	
SS	0700	
SP	FFFE	
BP	0000	
SI	0000	
DI	0000	
DS	0700	
ES	0700	

```
0700:0104

07100: B0 176 ▒
07101: 39 057 9
07102: 04 004 ♦
07103: 35 053 5
07104: C3 195 ├
07105: 90 144 É
07106: 90 144 É
07107: 90 144 É
07108: 90 144 É
07109: 90 144 É
0710A: 90 144 É
0710B: 90 144 É
0710C: 90 144 É
0710D: 90 144 É
0710E: 90 144 É
0710F: 90 144 É
07110: 90 144 É
07111: 90 144 É
07112: 90 144 É
07113: 90 144 É
07114: 90 144 É
07115: 90 144 É
07116: 90 144 É
07117: 90 144 É
07118: 90 144 É
07119: F4 244 ⌠
0711A: 00 000 NULL
```

```
0700:0104

MOV AL, 039h
ADD AL, 035h
RET
NOP
NOP
NOP
NOP
NOP
NOP
NOP
NOP
NOP
NOP
NOP
NOP
NOP
NOP
NOP
NOP
NOP
NOP
HLT
ADD [BX + SI], A
ADD [BX + SI], A
...
```

original source code

```
; You may customize this and ot
; The location of this template

org 100h

MOV AL,'9'
ADD AL, '5'


ret
```

line: 18 col: 19 drag a file here to open

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