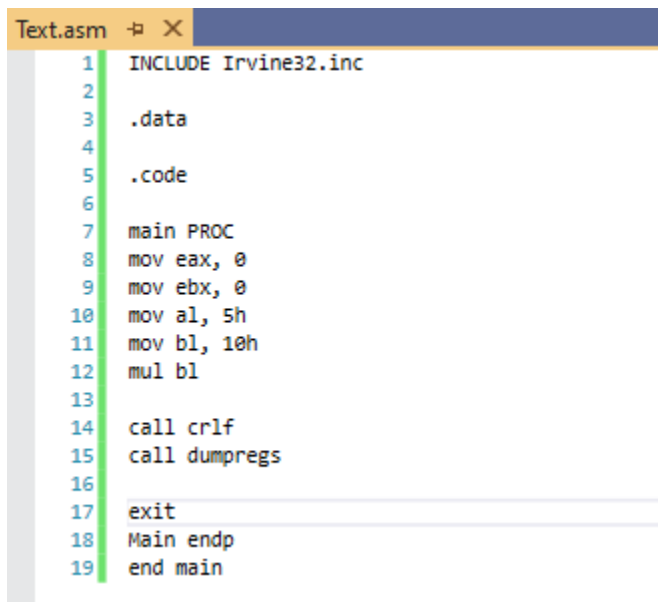Name: **Kashif Ali**

Roll No: **20P-0648**
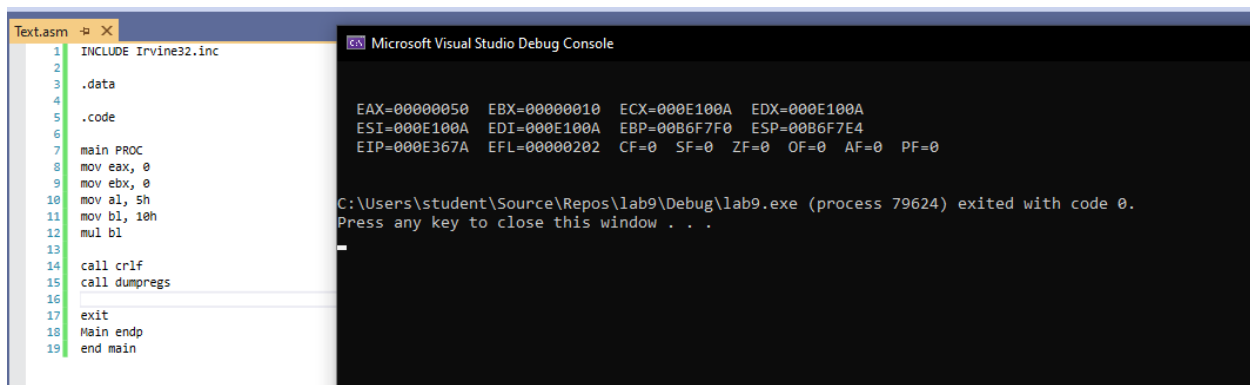
Lab-09

Example 1

```
Text.asm ╬ ╳
     1    INCLUDE Irvine32.inc
     2
     3    .data
     4
     5    .code
     6
     7    main PROC
     8    mov eax, 0
     9    mov ebx, 0
    10    mov al, 5h
    11    mov bl, 10h
    12    mul bl
    13
    14    call crlf
    15    call dumpregs
    16
    17    exit
    18    Main endp
    19    end main
```

Output of Example 1

```
Text.asm ╬ ╳                    ◙ Microsoft Visual Studio Debug Console
     1    INCLUDE Irvine32.inc
     2
     3    .data
     4
     5    .code                     EAX=00000050  EBX=00000010  ECX=000E100A  EDX=000E100A
     6                              ESI=000E100A  EDI=000E100A  EBP=00B6F7F0  ESP=00B6F7E4
     7    main PROC                 EIP=000E367A  EFL=00000202  CF=0  SF=0  ZF=0  OF=0  AF=0  PF=0
     8    mov eax, 0
     9    mov ebx, 0
    10    mov al, 5h             C:\Users\student\Source\Repos\lab9\Debug\lab9.exe (process 79624) exited with code 0.
    11    mov bl, 10h            Press any key to close this window . . .
    12    mul bl
    13
    14    call crlf
    15    call dumpregs
    16
    17    exit
    18    Main endp
    19    end main
```

Example 2 code

```
Text.asm    ⊣ X
    1    INCLUDE Irvine32.inc
    2
    3    .data
    4    val1 WORD 2000h
    5    val2 WORD 0100h
    6
    7    .code
    8    main PROC
    9    mov eax, 1
   10    mov ax, val1
   11    mul val2
   12    call writedec
   13    call crlf
   14    call dumpregs
   15
   16    exit
   17    Main endp
   18    end main
```
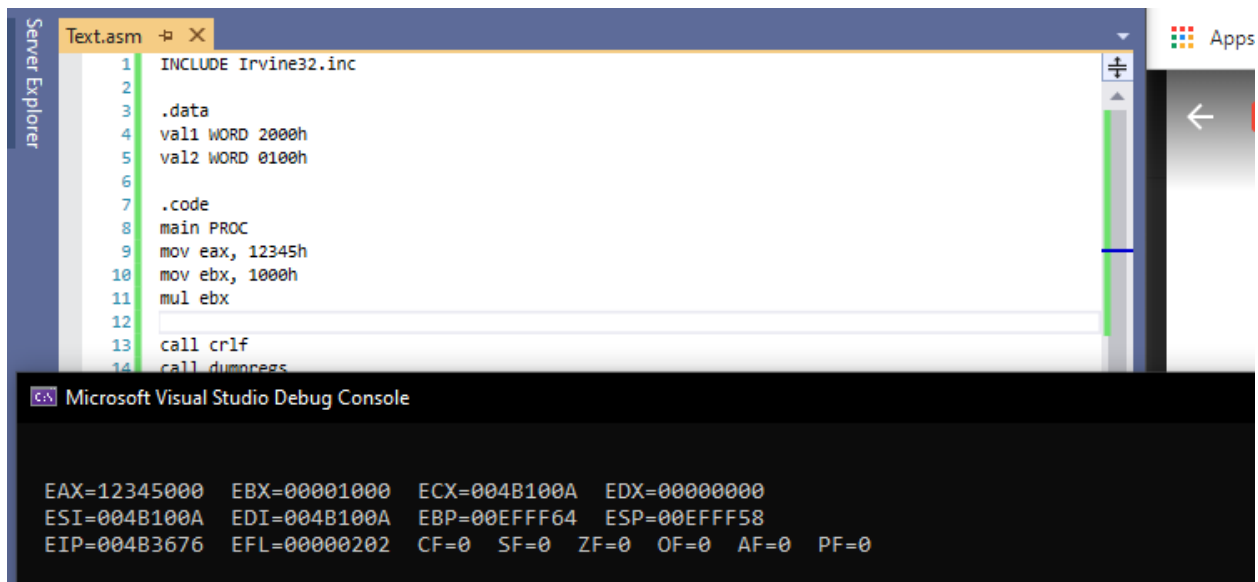
Example 2 output

```
Text.asm    ⊣ X
    1    INCLUDE Irvine32.inc
    2
    3    .data
    4    val1 WORD 2000h
    5    val2 WORD 0100h
    6
    7    .code
    8    main PROC
    9    mov eax, 1
   10    mov ax, val1
   11    mul val2
   12    mov eax, 200000
```

```
Microsoft Visual Studio Debug Console
200000

EAX=00030D40   EBX=011DA000   ECX=00F4100A   EDX=00F40020
ESI=00F4100A   EDI=00F4100A   EBP=00E2FAF0   ESP=00E2FAE4
EIP=00F43686   EFL=00000202   CF=0   SF=0   ZF=0   OF=0   AF=0   PF=0
```
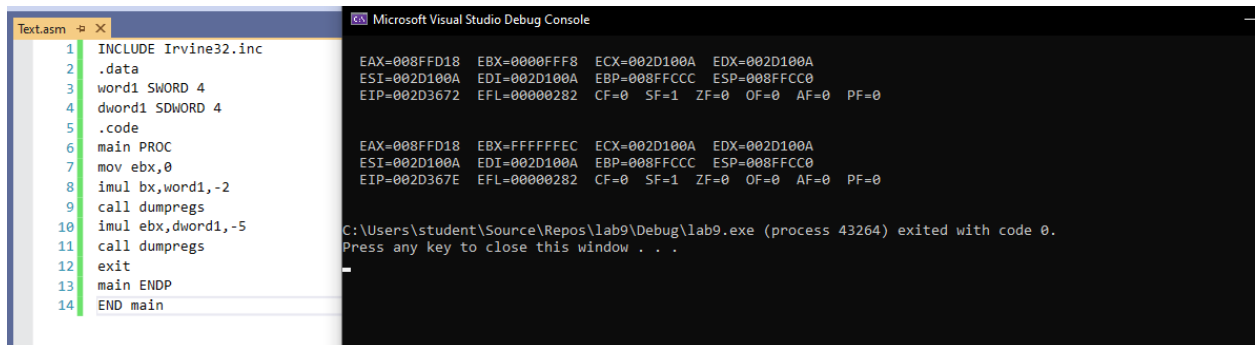
Example 3 with output

```
Text.asm   ⊕ ×                                                        ⊞ Apps
Server Explorer
    1    INCLUDE Irvine32.inc                                    ÷
    2
    3    .data                                                   ▲
    4    val1 WORD 2000h                                         ←
    5    val2 WORD 0100h
    6
    7    .code
    8    main PROC
    9    mov eax, 12345h
   10    mov ebx, 1000h
   11    mul ebx
   12
   13    call crlf
   14    call dumpregs
```

```
⬛ Microsoft Visual Studio Debug Console

    EAX=12345000   EBX=00001000   ECX=004B100A   EDX=00000000
    ESI=004B100A   EDI=004B100A   EBP=00EFFF64   ESP=00EFFF58
    EIP=004B3676   EFL=00000202   CF=0  SF=0  ZF=0  OF=0  AF=0  PF=0
```

Basic IMUL Example with output

```
Text.asm  ⊕ ×
    1    INCLUDE Irvine32.inc
    2    .data
    3    word1 SWORD 4
    4    dword1 SDWORD 4
    5    .code
    6    main PROC
    7    mov ebx,0
    8    imul bx,word1,-2
    9    call dumpregs
   10    imul ebx,dword1,-5
   11    call dumpregs
   12    exit
   13    main ENDP
   14    END main
```

```
⬛ Microsoft Visual Studio Debug Console                              —

    EAX=008FFD18   EBX=0000FFF8   ECX=002D100A   EDX=002D100A
    ESI=002D100A   EDI=002D100A   EBP=008FFCCC   ESP=008FFCC0
    EIP=002D3672   EFL=00000282   CF=0  SF=1  ZF=0  OF=0  AF=0  PF=0

    EAX=008FFD18   EBX=FFFFFFEC   ECX=002D100A   EDX=002D100A
    ESI=002D100A   EDI=002D100A   EBP=008FFCCC   ESP=008FFCC0
    EIP=002D367E   EFL=00000282   CF=0  SF=1  ZF=0  OF=0  AF=0  PF=0

C:\Users\student\Source\Repos\lab9\Debug\lab9.exe (process 43264) exited with code 0.
Press any key to close this window . . .
```

Imul: Multiplication Example

```
Text.asm  ⊦ X
     1    INCLUDE Irvine32.inc
     2
     3    .data
     4    word1 SWORD 4
     5    dword1 SDWORD 4
     6
     7    .code
     8    main PROC
     9    mov eax, 0
    10    mov ebx, 0
    11    mov ax, -4
    12    mov bx, 2
    13    call dumpregs
    14    IMUL bx, ax
    15    call Dumpregs
    16    imul bx,2              ;BX=-16
    17    call dumpregs
    18    imul bx,word1          ;BX=-64
    19    mov eax,-16
    20    mov ebx,2
    21    call dumpregs
    22    imul ebx,eax
    23    call dumpregs
    24    imul ebx,2
    25    call dumpregs
    26    imul ebx,dword1
    27    call dumpregs
    28
```

Imul: Multiplication Example output

```
EAX=0000FFFC  EBX=0000FFF0  ECX=00FB100A  EDX=00FB100A
ESI=00FB100A  EDI=00FB100A  EBP=00AFFC8C  ESP=00AFFC80
EIP=00FB3689  EFL=00000286  CF=0  SF=1  ZF=0  OF=0  AF=0  PF=1


EAX=FFFFFFF0  EBX=00000002  ECX=00FB100A  EDX=00FB100A
ESI=00FB100A  EDI=00FB100A  EBP=00AFFC8C  ESP=00AFFC80
EIP=00FB36A0  EFL=00000286  CF=0  SF=1  ZF=0  OF=0  AF=0  PF=1


EAX=FFFFFFF0  EBX=FFFFFFE0  ECX=00FB100A  EDX=00FB100A
ESI=00FB100A  EDI=00FB100A  EBP=00AFFC8C  ESP=00AFFC80
EIP=00FB36A8  EFL=00000282  CF=0  SF=1  ZF=0  OF=0  AF=0  PF=0


EAX=FFFFFFF0  EBX=FFFFFFC0  ECX=00FB100A  EDX=00FB100A
ESI=00FB100A  EDI=00FB100A  EBP=00AFFC8C  ESP=00AFFC80
EIP=00FB36B0  EFL=00000286  CF=0  SF=1  ZF=0  OF=0  AF=0  PF=1


EAX=FFFFFFF0  EBX=FFFFFF00  ECX=00FB100A  EDX=00FB100A
ESI=00FB100A  EDI=00FB100A  EBP=00AFFC8C  ESP=00AFFC80
EIP=00FB36BC  EFL=00000286  CF=0  SF=1  ZF=0  OF=0  AF=0  PF=1


C:\Users\student\Source\Repos\lab9\Debug\lab9.exe (process 79068) exited with code 0.
Press any key to close this window . . .
```
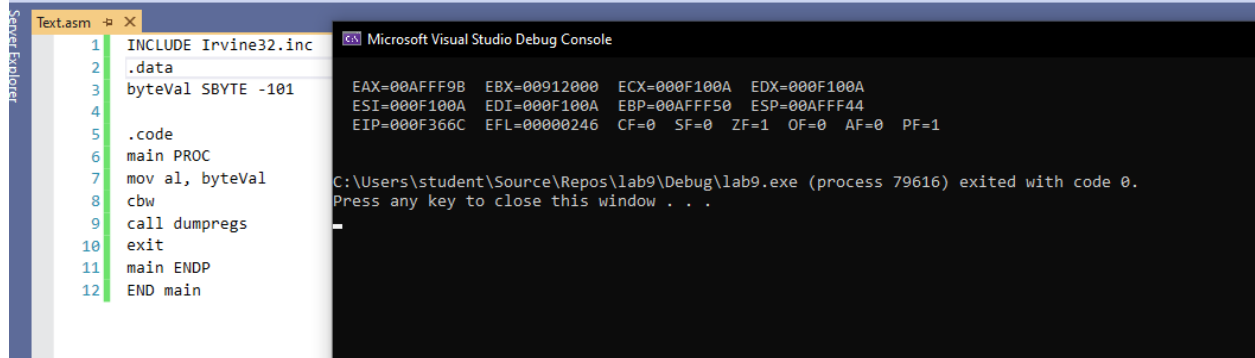
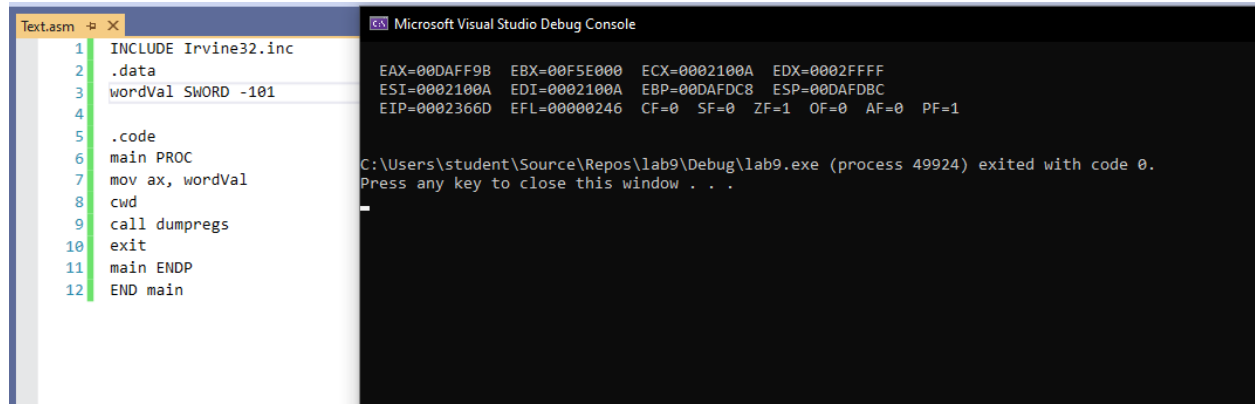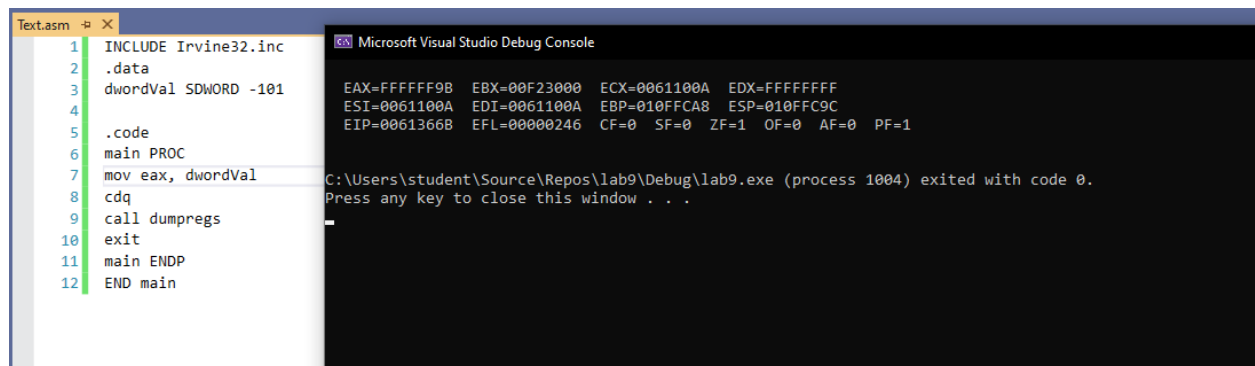## CBW: Example with output

```
Text.asm
1    INCLUDE Irvine32.inc
2    .data
3    byteVal SBYTE -101
4
5    .code
6    main PROC
7    mov al, byteVal
8    cbw
9    call dumpregs
10   exit
11   main ENDP
12   END main
```

```
Microsoft Visual Studio Debug Console

  EAX=00AFFF9B   EBX=00912000   ECX=000F100A   EDX=000F100A
  ESI=000F100A   EDI=000F100A   EBP=00AFFF50   ESP=00AFFF44
  EIP=000F366C   EFL=00000246   CF=0   SF=0   ZF=1   OF=0   AF=0   PF=1

C:\Users\student\Source\Repos\lab9\Debug\lab9.exe (process 79616) exited with code 0.
Press any key to close this window . . .
```

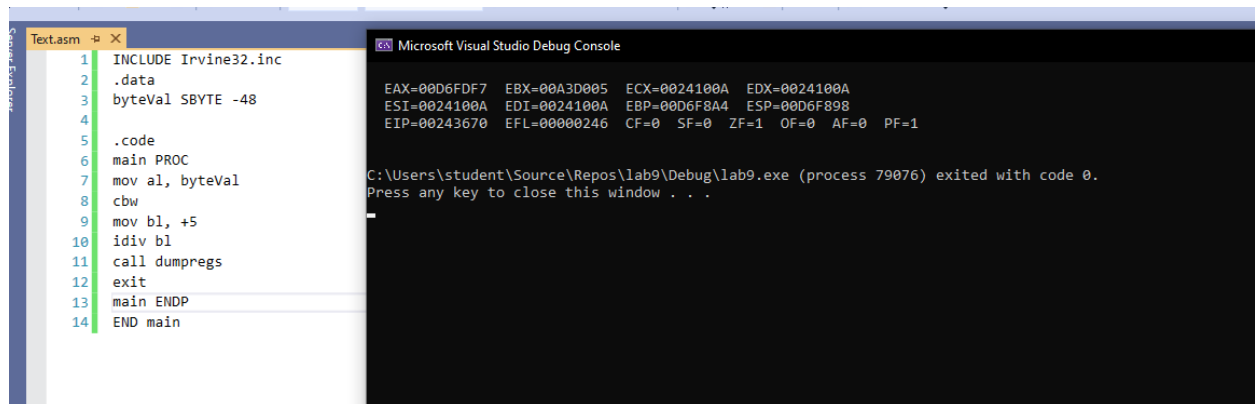## CWD: Example with output

```
Text.asm
1    INCLUDE Irvine32.inc
2    .data
3    wordVal SWORD -101
4
5    .code
6    main PROC
7    mov ax, wordVal
8    cwd
9    call dumpregs
10   exit
11   main ENDP
12   END main
```

```
Microsoft Visual Studio Debug Console

  EAX=00DAFF9B   EBX=00F5E000   ECX=0002100A   EDX=0002FFFF
  ESI=0002100A   EDI=0002100A   EBP=00DAFDC8   ESP=00DAFDBC
  EIP=0002366D   EFL=00000246   CF=0   SF=0   ZF=1   OF=0   AF=0   PF=1

C:\Users\student\Source\Repos\lab9\Debug\lab9.exe (process 49924) exited with code 0.
Press any key to close this window . . .
```
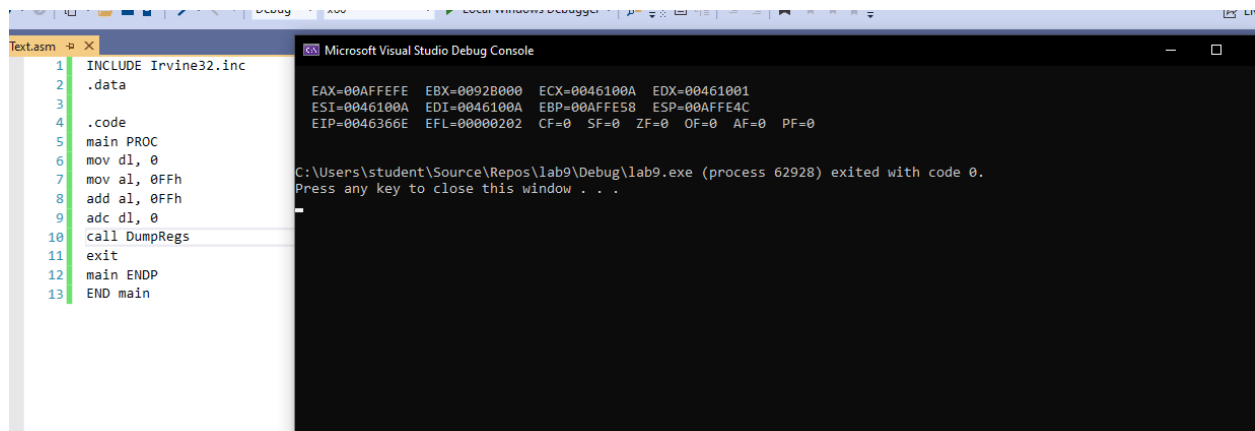
CDQ: Example with output

```
Text.asm
1    INCLUDE Irvine32.inc
2    .data
3    dwordVal SDWORD -101
4
5    .code
6    main PROC
7    mov eax, dwordVal
8    cdq
9    call dumpregs
10   exit
11   main ENDP
12   END main
```

```
Microsoft Visual Studio Debug Console

  EAX=FFFFFF9B   EBX=00F23000   ECX=0061100A   EDX=FFFFFFFF
  ESI=0061100A   EDI=0061100A   EBP=010FFCA8   ESP=010FFC9C
  EIP=0061366B   EFL=00000246   CF=0   SF=0   ZF=1   OF=0   AF=0   PF=1

C:\Users\student\Source\Repos\lab9\Debug\lab9.exe (process 1004) exited with code 0.
Press any key to close this window . . .
```
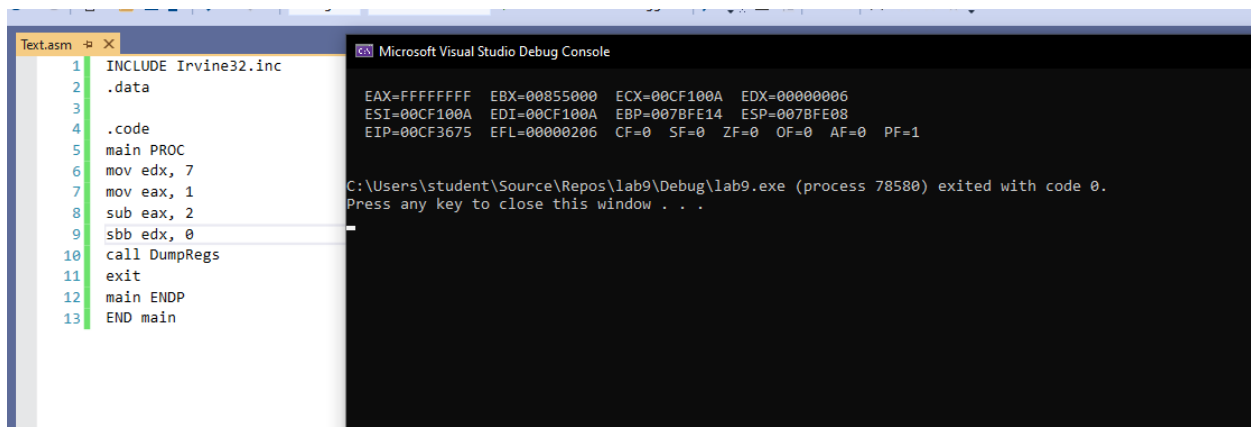
IDIV: Example with output

```asm
INCLUDE Irvine32.inc
.data
byteVal SBYTE -48

.code
main PROC
mov al, byteVal
cbw
mov bl, +5
idiv bl
call dumpregs
exit
main ENDP
END main
```

```
EAX=00D6FDF7  EBX=00A3D005  ECX=0024100A  EDX=0024100A
ESI=0024100A  EDI=0024100A  EBP=00D6F8A4  ESP=00D6F898
EIP=00243670  EFL=00000246  CF=0  SF=0  ZF=1  OF=0  AF=0  PF=1

C:\Users\student\Source\Repos\lab9\Debug\lab9.exe (process 79076) exited with code 0.
Press any key to close this window . . .
```

adc: Example with output

```asm
INCLUDE Irvine32.inc
.data

.code
main PROC
mov dl, 0
mov al, 0FFh
add al, 0FFh
adc dl, 0
call DumpRegs
exit
main ENDP
END main
```

```
EAX=00AFFEFE  EBX=0092B000  ECX=0046100A  EDX=00461001
ESI=0046100A  EDI=0046100A  EBP=00AFFE58  ESP=00AFFE4C
EIP=0046366E  EFL=00000202  CF=0  SF=0  ZF=0  OF=0  AF=0  PF=0

C:\Users\student\Source\Repos\lab9\Debug\lab9.exe (process 62928) exited with code 0.
Press any key to close this window . . .
```

sbb: Example with output

```asm
INCLUDE Irvine32.inc
.data

.code
main PROC
mov edx, 7
mov eax, 1
sub eax, 2
sbb edx, 0
call DumpRegs
exit
main ENDP
END main
```

```
EAX=FFFFFFFF  EBX=00855000  ECX=00CF100A  EDX=00000006
ESI=00CF100A  EDI=00CF100A  EBP=007BFE14  ESP=007BFE08
EIP=00CF3675  EFL=00000206  CF=0  SF=0  ZF=0  OF=0  AF=0  PF=1

C:\Users\student\Source\Repos\lab9\Debug\lab9.exe (process 78580) exited with code 0.
Press any key to close this window . . .
```