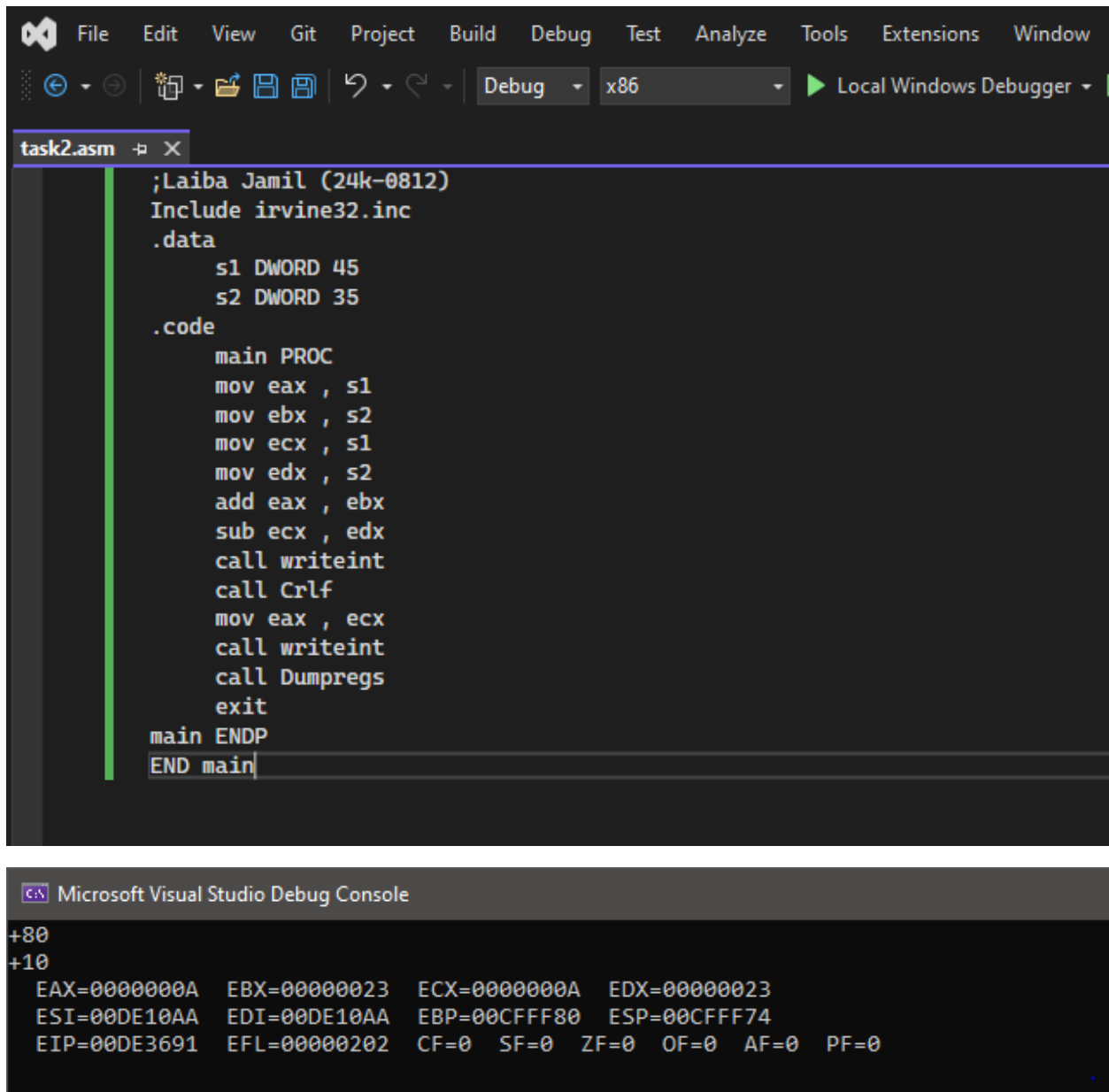


COAL HOME TASK 4A:

Task 1:



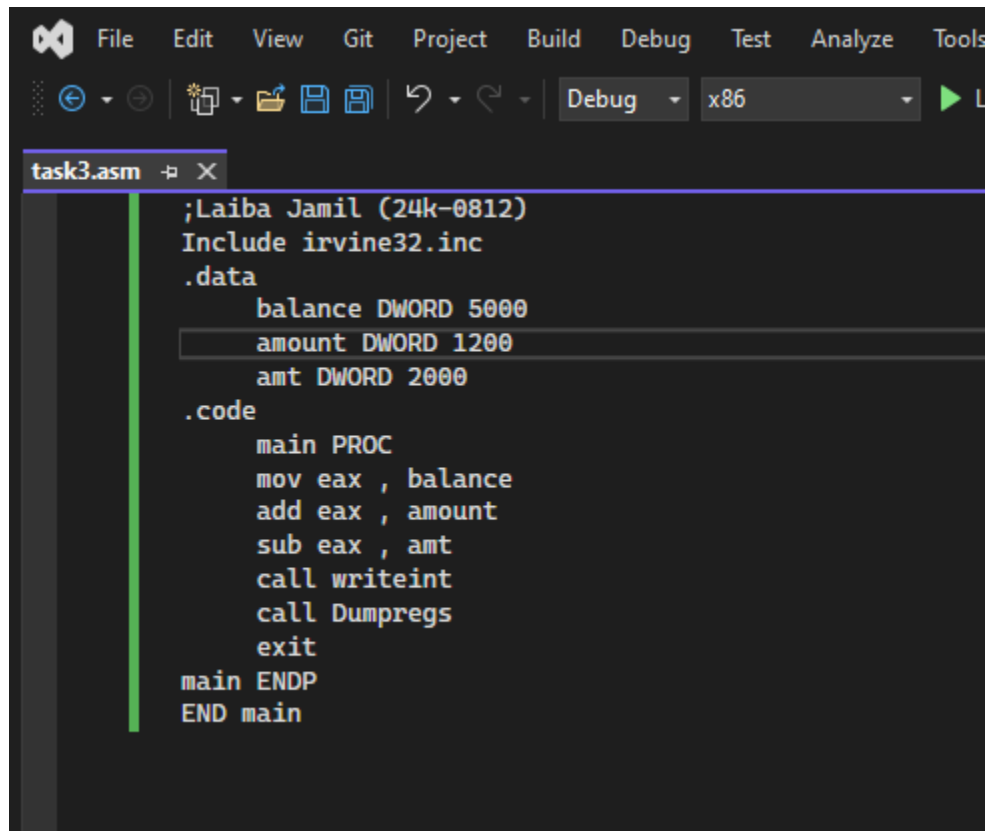
The image shows a screenshot of the Visual Studio IDE. The top menu bar includes File, Edit, View, Git, Project, Build, Debug, Test, Analyze, Tools, Extensions, and Window. The toolbar shows icons for undo, redo, save, and a dropdown menu with 'Debug' and 'x86'. The 'Local Windows Debugger' is selected. The main editor window displays the assembly file 'task2.asm' with the following code:

```
;Laiba Jamil (24k-0812)
Include irvine32.inc
.data
    s1 DWORD 45
    s2 DWORD 35
.code
    main PROC
        mov eax, s1
        mov ebx, s2
        mov ecx, s1
        mov edx, s2
        add eax, ebx
        sub ecx, edx
        call writeint
        call Crlf
        mov eax, ecx
        call writeint
        call Dumpregs
        exit
    main ENDP
END main
```

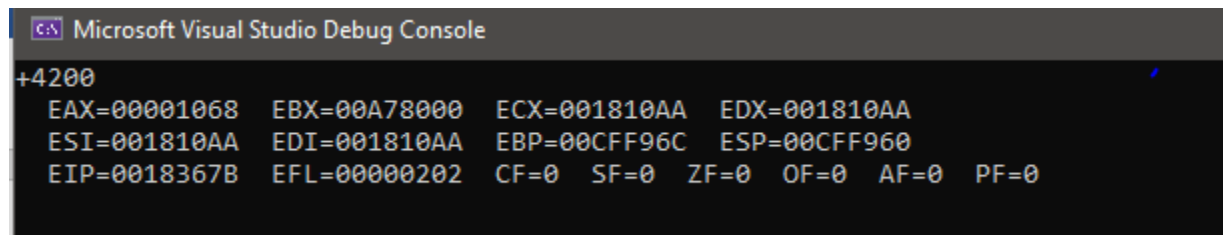
The bottom panel shows the 'Microsoft Visual Studio Debug Console' with the following output:

```
+80
+10
EAX=0000000A  EBX=00000023  ECX=0000000A  EDX=00000023
ESI=00DE10AA  EDI=00DE10AA  EBP=00CFFF80  ESP=00CFFF74
EIP=00DE3691  EFL=00000202  CF=0  SF=0  ZF=0  OF=0  AF=0  PF=0
```

Task 2:

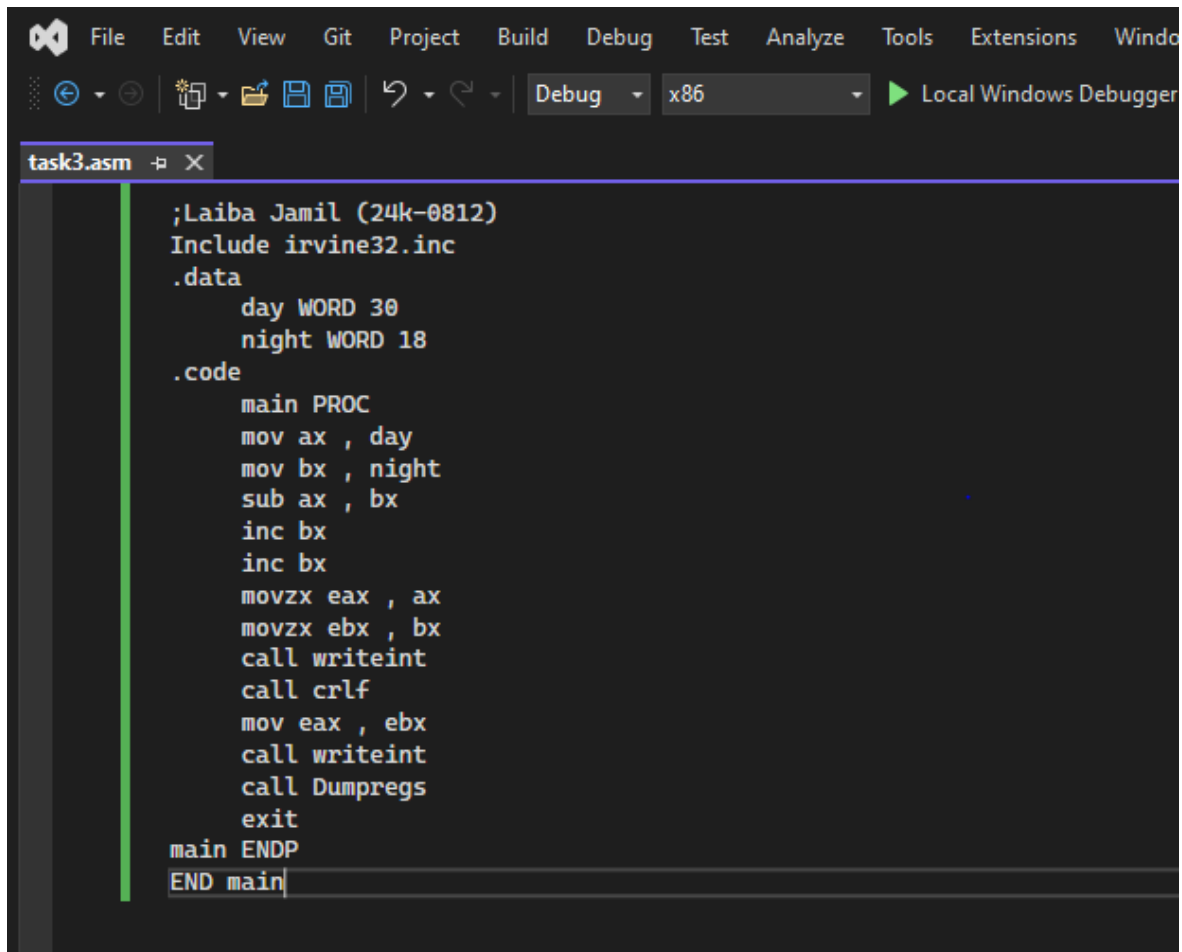


```
task3.asm
;Laiba Jamil (24k-0812)
Include Irvine32.inc
.data
    balance DWORD 5000
    amount DWORD 1200
    amt DWORD 2000
.code
main PROC
    mov eax, balance
    add eax, amount
    sub eax, amt
    call writeint
    call Dumpregs
    exit
main ENDP
END main
```

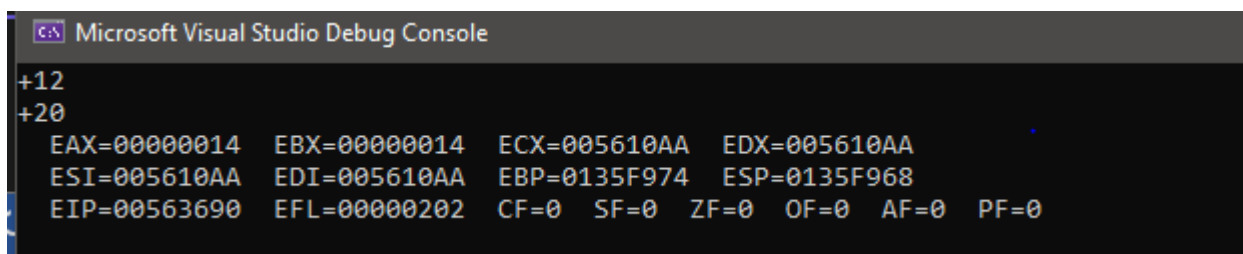


```
Microsoft Visual Studio Debug Console
+4200
EAX=00001068  EBX=00A78000  ECX=001810AA  EDX=001810AA
ESI=001810AA  EDI=001810AA  EBP=00CFF96C  ESP=00CFF960
EIP=0018367B  EFL=00000202  CF=0   SF=0   ZF=0   OF=0   AF=0   PF=0
```

Task 3:



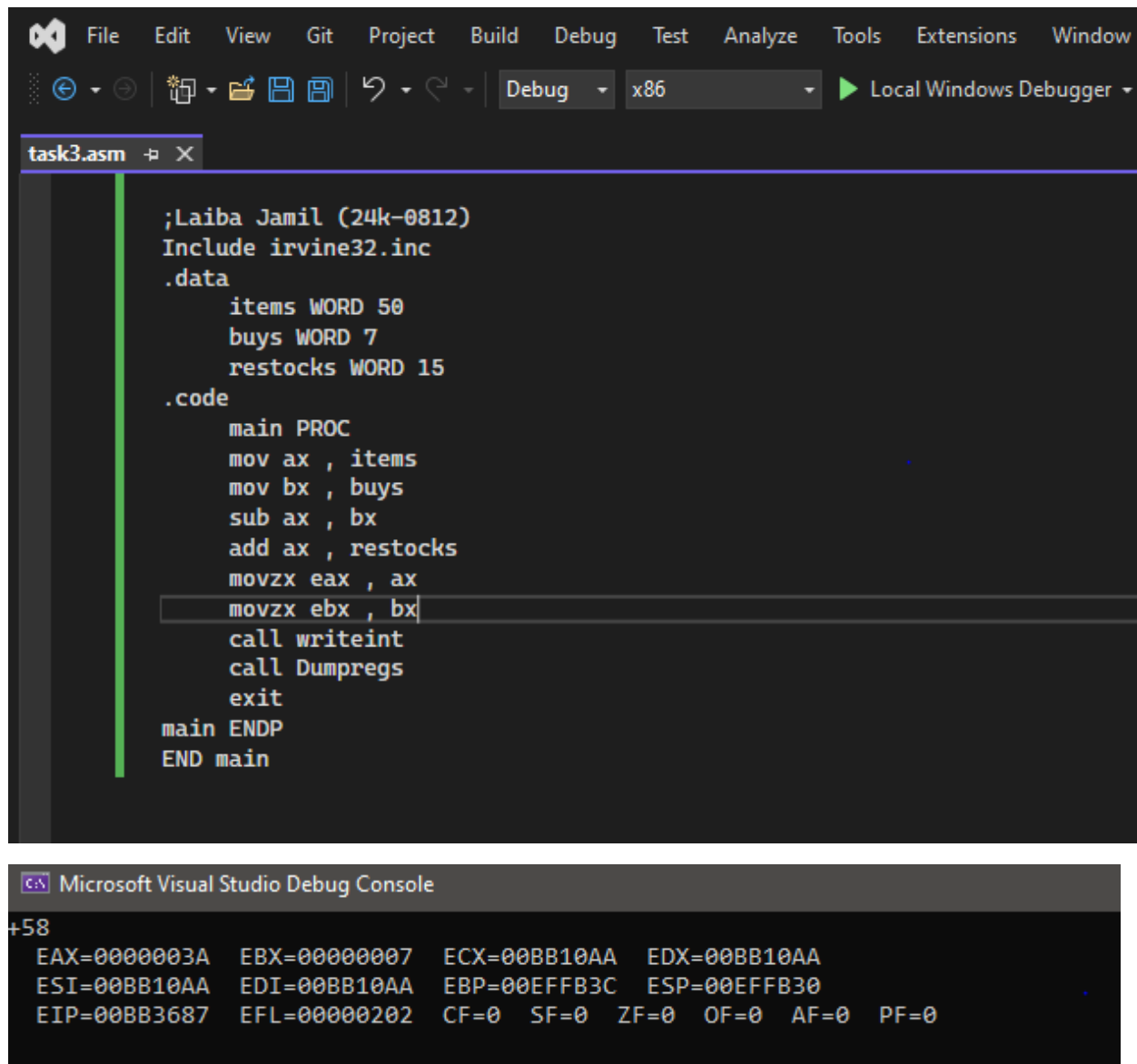
```
;Laiba Jamil (24k-0812)
Include irvine32.inc
.data
    day WORD 30
    night WORD 18
.code
    main PROC
        mov ax , day
        mov bx , night
        sub ax , bx
        inc bx
        inc bx
        movzx eax , ax
        movzx ebx , bx
        call writeint
        call crlf
        mov eax , ebx
        call writeint
        call Dumpregs
        exit
    main ENDP
END main
```



```
Microsoft Visual Studio Debug Console

+12
+20
EAX=00000014  EBX=00000014  ECX=005610AA  EDX=005610AA
ESI=005610AA  EDI=005610AA  EBP=0135F974  ESP=0135F968
EIP=00563690  EFL=00000202  CF=0   SF=0   ZF=0   OF=0   AF=0   PF=0
```

Task 4:



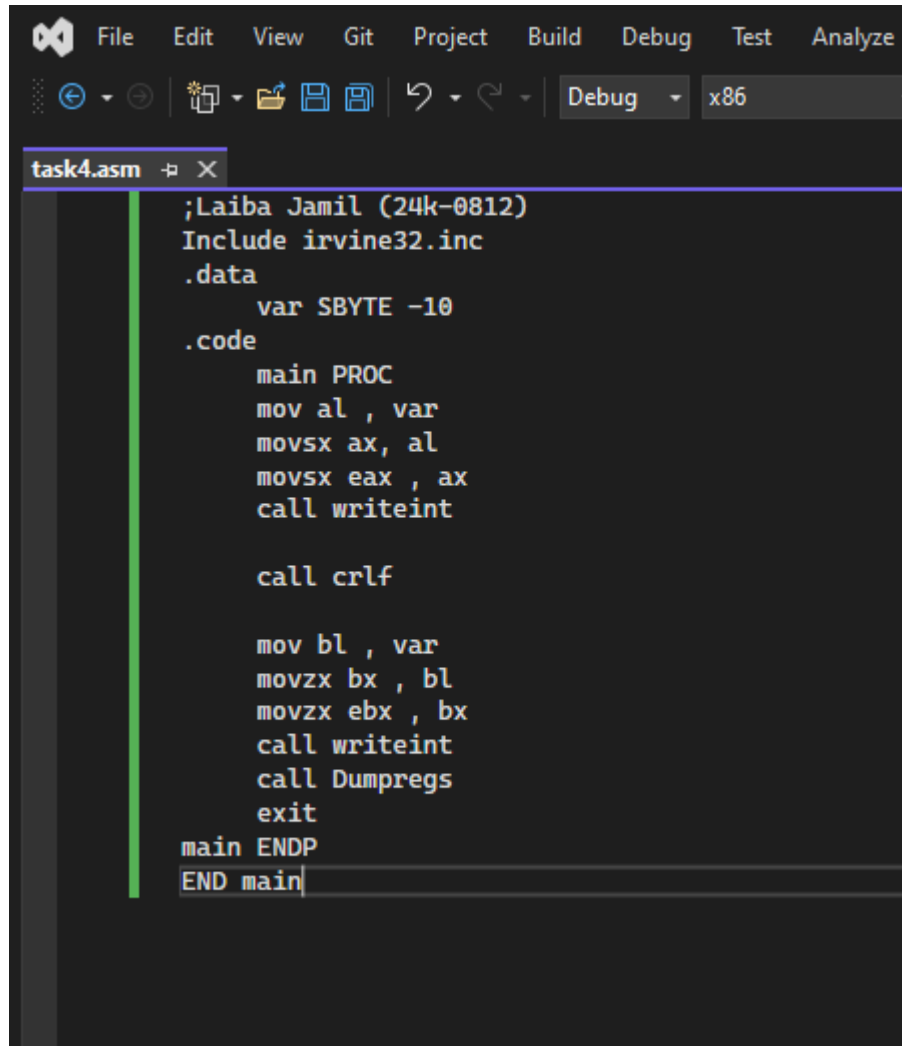
The image shows a screenshot of the Visual Studio IDE. The top menu bar includes File, Edit, View, Git, Project, Build, Debug, Test, Analyze, Tools, Extensions, and Window. Below the menu bar is a toolbar with icons for navigation and development. The main editor window displays an assembly file named 'task3.asm'. The code in the file is as follows:

```
;Laiba Jamil (24k-0812)
Include irvine32.inc
.data
    items WORD 50
    buys WORD 7
    restocks WORD 15
.code
main PROC
    mov ax , items
    mov bx , buys
    sub ax , bx
    add ax , restocks
    movzx eax , ax
    movzx ebx , bx
    call writeint
    call Dumpregs
    exit
main ENDP
END main
```

The line 'movzx ebx , bx' is highlighted with a green vertical bar. Below the editor window is the 'Microsoft Visual Studio Debug Console'. It shows the following output:

```
+58
EAX=0000003A  EBX=00000007  ECX=00BB10AA  EDX=00BB10AA
ESI=00BB10AA  EDI=00BB10AA  EBP=00EFFB3C  ESP=00EFFB30
EIP=00BB3687  EFL=00000202  CF=0  SF=0  ZF=0  OF=0  AF=0  PF=0
```

Task 5:

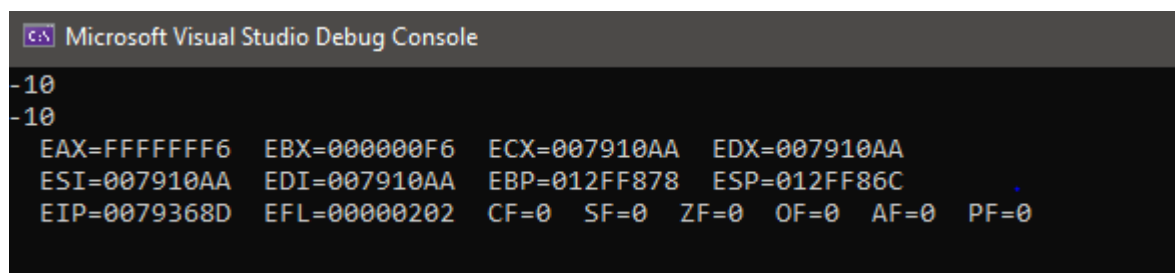


The screenshot shows the Visual Studio Code editor with a file named `task4.asm` open. The code is written in assembly language and includes comments. The code defines a variable `SBYTE` with a value of `-10` and a `main` procedure. The `main` procedure prints the value of `SBYTE` using `writeint`, prints a newline using `crlf`, and then prints the value of `SBYTE` again using `writeint`. The `main` procedure ends with `exit` and `main ENDP`.

```
;Laiba Jamil (24k-0812)
Include irvine32.inc
.data
    var SBYTE -10
.code
    main PROC
        mov al , var
        movsx ax, al
        movsx eax , ax
        call writeint

        call crlf

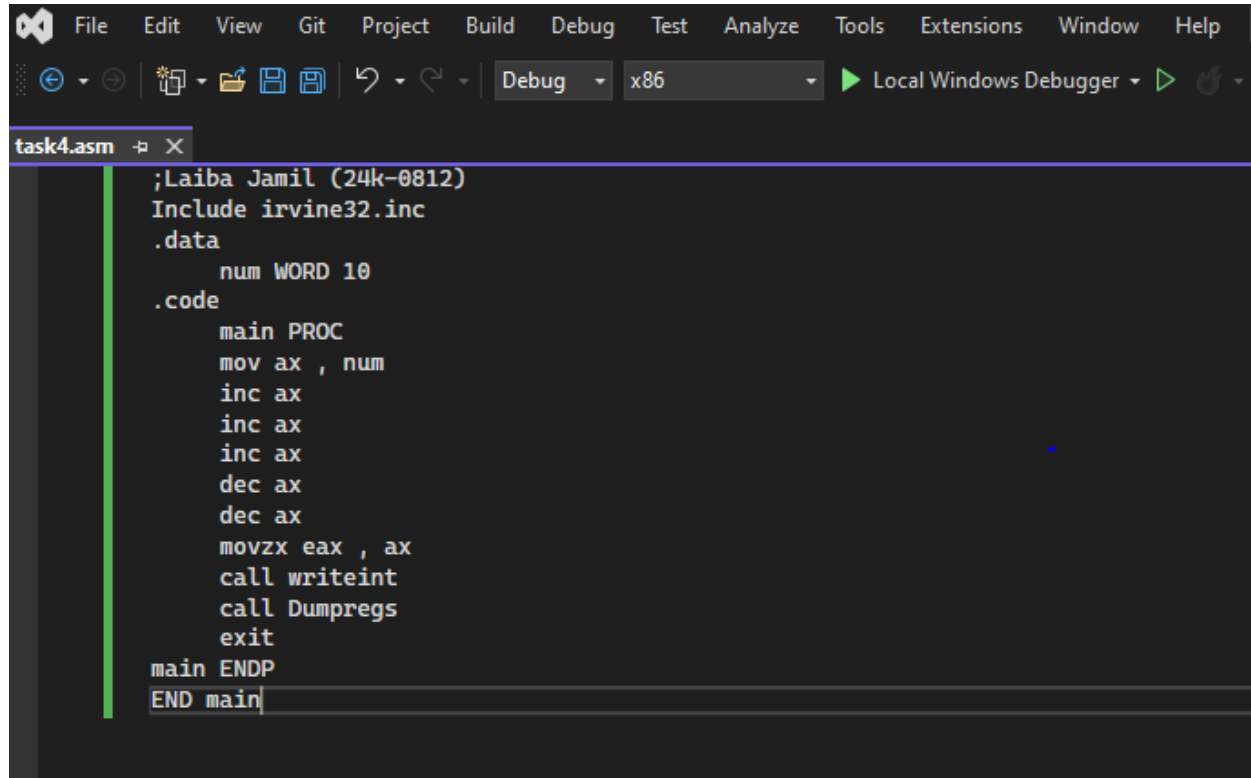
        mov bl , var
        movzx bx , bl
        movzx ebx , bx
        call writeint
        call Dumpregs
        exit
    main ENDP
END main
```



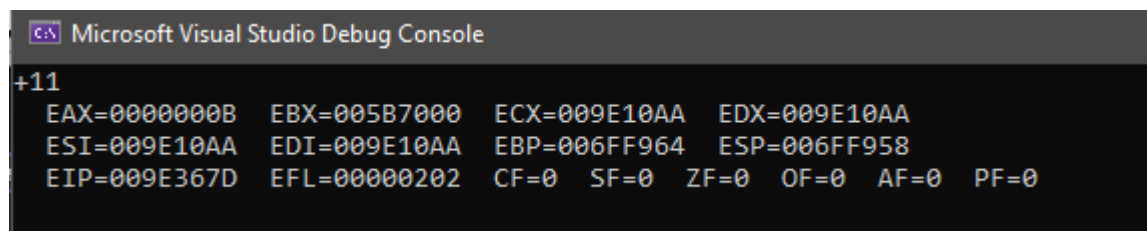
The screenshot shows the Microsoft Visual Studio Debug Console. It displays the output of the program, which is `-10` followed by a newline and `-10`. Below the output, the register values are listed:

```
EAX=FFFFFFFF EBX=000000F6 ECX=007910AA EDX=007910AA
ESI=007910AA EDI=007910AA EBP=012FF878 ESP=012FF86C
EIP=0079368D EFL=00000202 CF=0 SF=0 ZF=0 OF=0 AF=0 PF=0
```

Task 6:

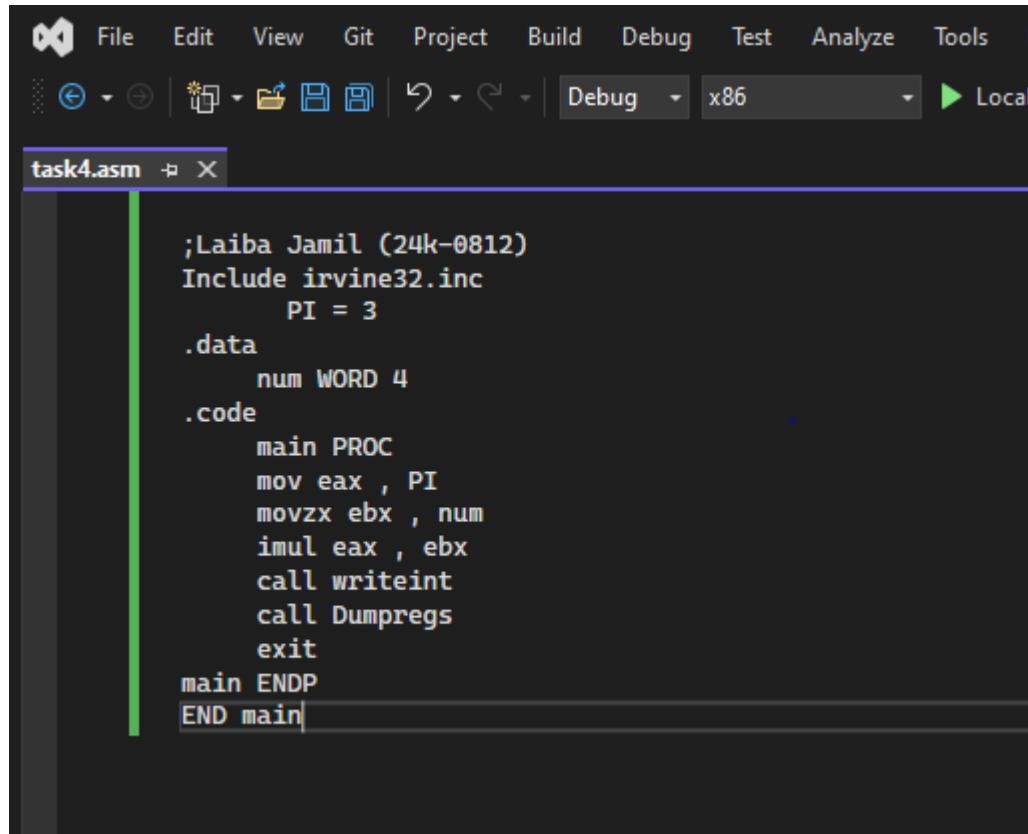


```
task4.asm
;Laiba Jamil (24k-0812)
Include irvine32.inc
.data
    num WORD 10
.code
    main PROC
        mov ax , num
        inc ax
        inc ax
        inc ax
        dec ax
        dec ax
        movzx eax , ax
        call writeint
        call Dumpregs
        exit
    main ENDP
END main
```

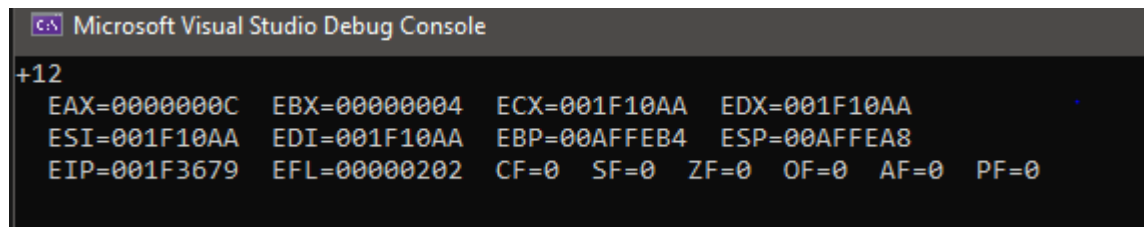


```
Microsoft Visual Studio Debug Console
+11
EAX=0000000B  EBX=005B7000  ECX=009E10AA  EDX=009E10AA
ESI=009E10AA  EDI=009E10AA  EBP=006FF964  ESP=006FF958
EIP=009E367D  EFL=00000202  CF=0  SF=0  ZF=0  OF=0  AF=0  PF=0
```

Task 7:

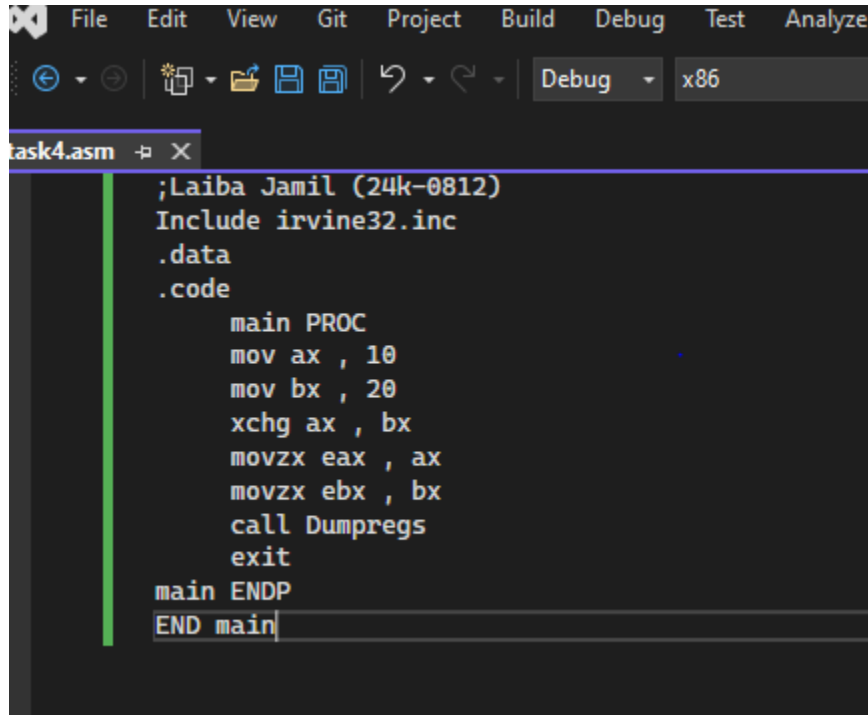


```
task4.asm
;Laiba Jamil (24k-0812)
Include Irvine32.inc
    PI = 3
.data
    num WORD 4
.code
main PROC
    mov eax, PI
    movzx ebx, num
    imul eax, ebx
    call writeint
    call Dumpregs
    exit
main ENDP
END main
```

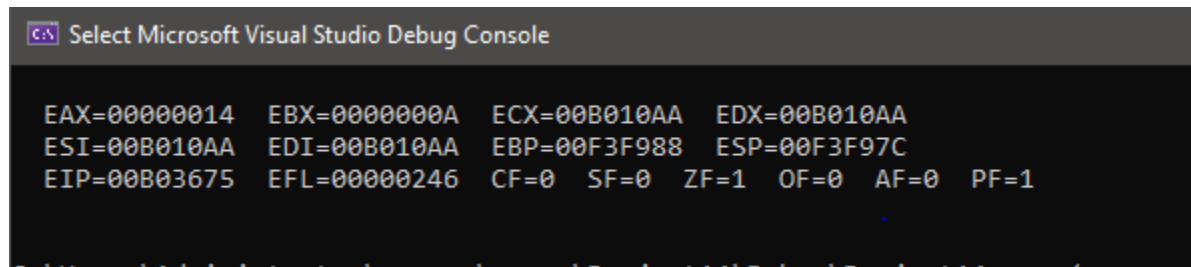


```
Microsoft Visual Studio Debug Console
+12
EAX=0000000C  EBX=00000004  ECX=001F10AA  EDX=001F10AA
ESI=001F10AA  EDI=001F10AA  EBP=00AFFEB4  ESP=00AFFEA8
EIP=001F3679  EFL=00000202  CF=0  SF=0  ZF=0  OF=0  AF=0  PF=0
```

Task 8:



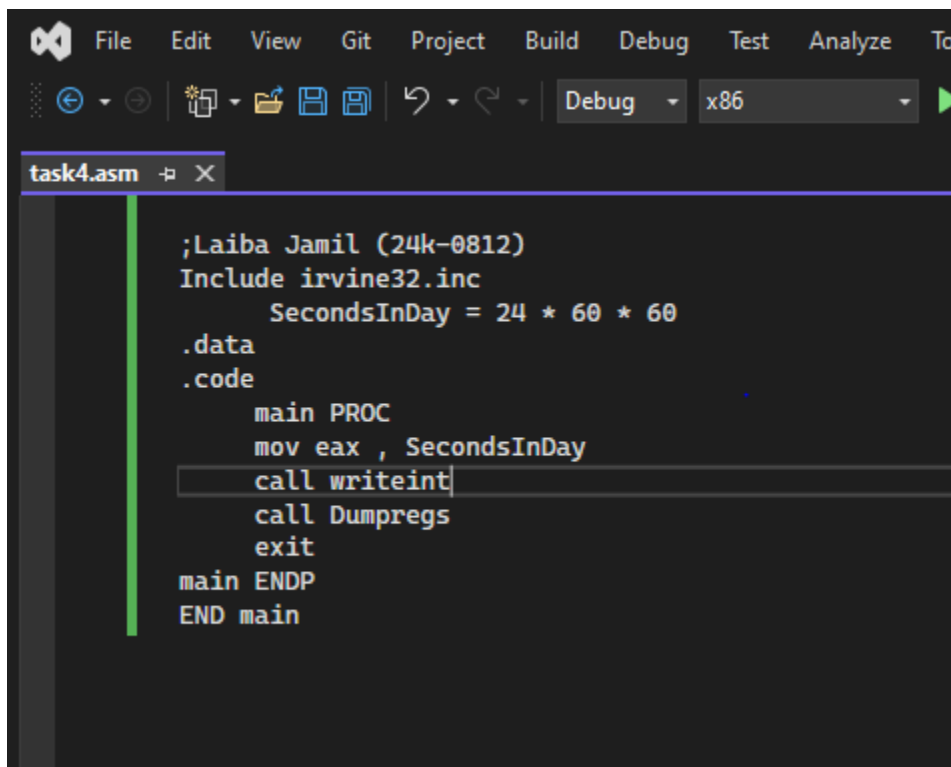
```
File Edit View Git Project Build Debug Test Analyze
task4.asm
;Laiba Jamil (24k-0812)
Include irvine32.inc
.data
.code
    main PROC
        mov ax , 10
        mov bx , 20
        xchg ax , bx
        movzx eax , ax
        movzx ebx , bx
        call Dumpregs
        exit
    main ENDP
END main
```



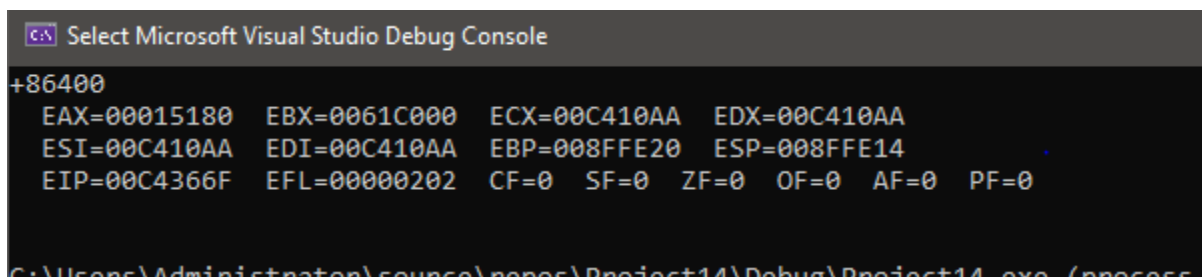
```
Select Microsoft Visual Studio Debug Console

EAX=00000014  EBX=0000000A  ECX=00B010AA  EDX=00B010AA
ESI=00B010AA  EDI=00B010AA  EBP=00F3F988  ESP=00F3F97C
EIP=00B03675  EFL=00000246  CF=0  SF=0  ZF=1  OF=0  AF=0  PF=1
```

Task 9:



```
task4.asm
;Laiba Jamil (24k-0812)
Include Irvine32.inc
        SecondsInDay = 24 * 60 * 60
.data
.code
        main PROC
            mov eax, SecondsInDay
            call writeint
            call Dumpregs
            exit
        main ENDP
END main
```



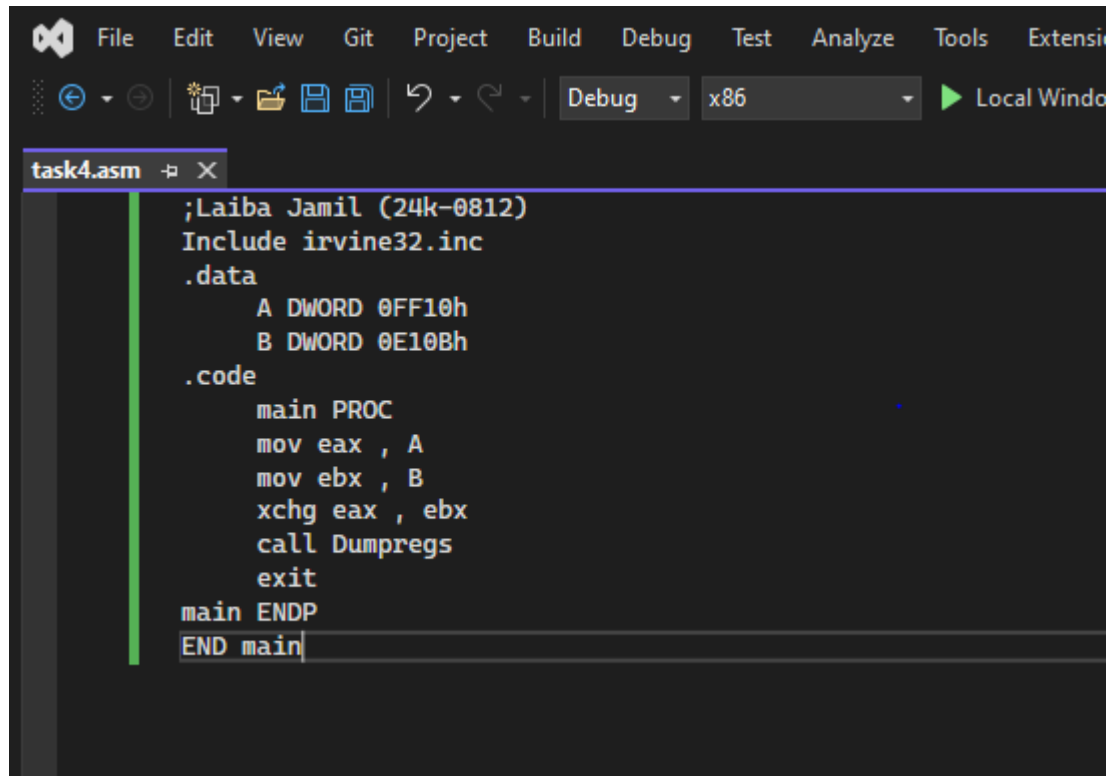
Select Microsoft Visual Studio Debug Console

+86400

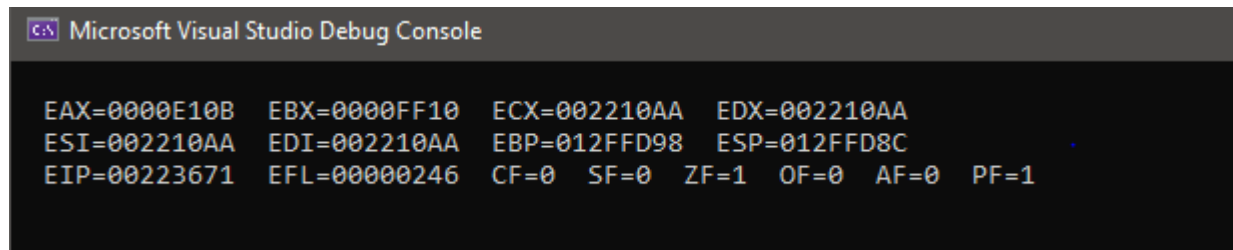
EAX=00015180	EBX=0061C000	ECX=00C410AA	EDX=00C410AA
ESI=00C410AA	EDI=00C410AA	EBP=008FFE20	ESP=008FFE14
EIP=00C4366F	EFL=00000202	CF=0	SF=0
ZF=0	OF=0	AF=0	PF=0

C:\Users\Administrator\source\repos\Project14\Debug\Project14.exe (process)

Task 10:



```
task4.asm
;Laiba Jamil (24k-0812)
Include irvine32.inc
.data
    A DWORD 0FF10h
    B DWORD 0E10Bh
.code
main PROC
    mov eax, A
    mov ebx, B
    xchg eax, ebx
    call Dumpregs
    exit
main ENDP
END main
```

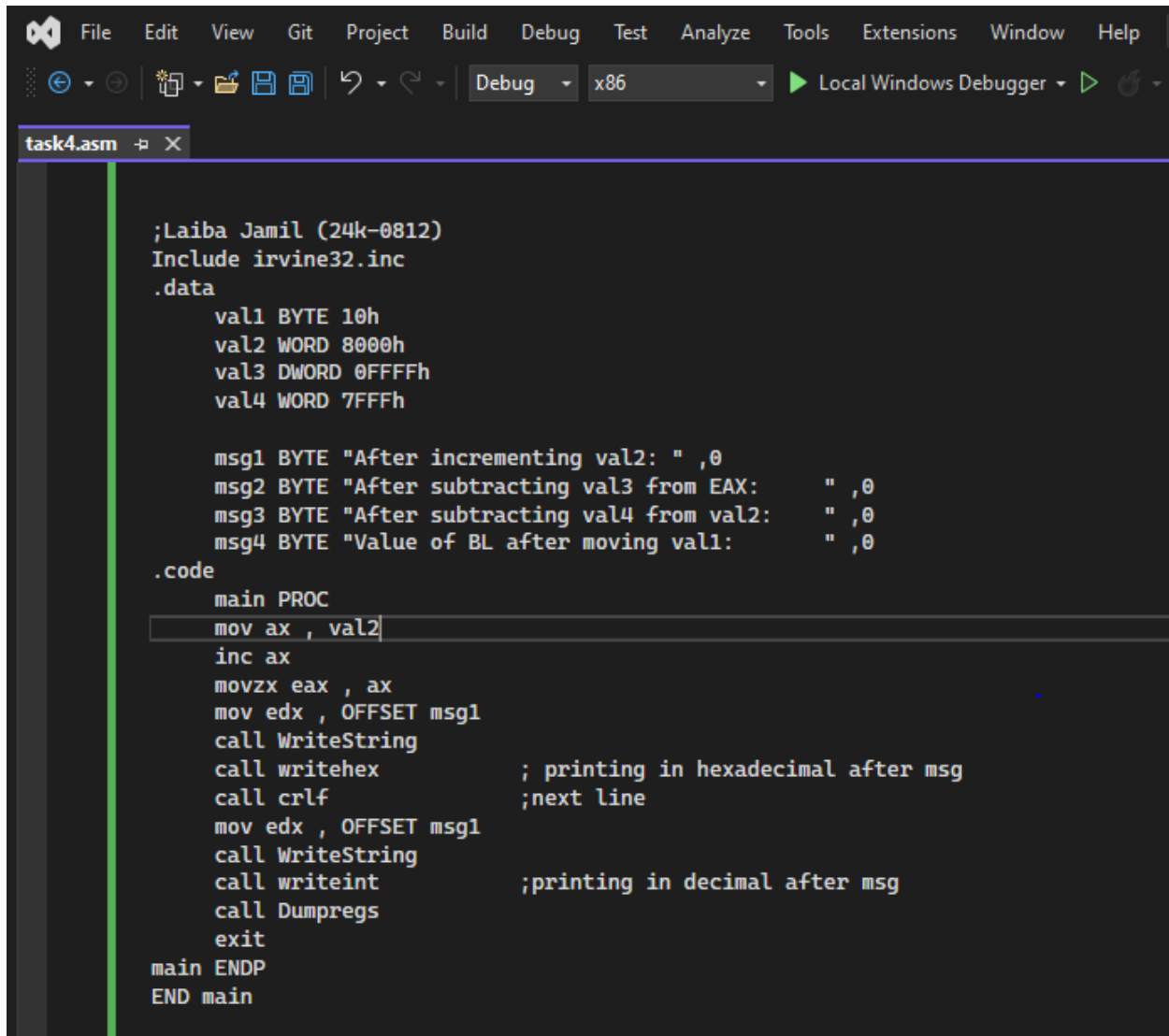


```
Microsoft Visual Studio Debug Console

EAX=0000E10B  EBX=0000FF10  ECX=002210AA  EDX=002210AA
ESI=002210AA  EDI=002210AA  EBP=012FFD98  ESP=012FFD8C
EIP=00223671  EFL=00000246  CF=0  SF=0  ZF=1  OF=0  AF=0  PF=1
```

Task 11:

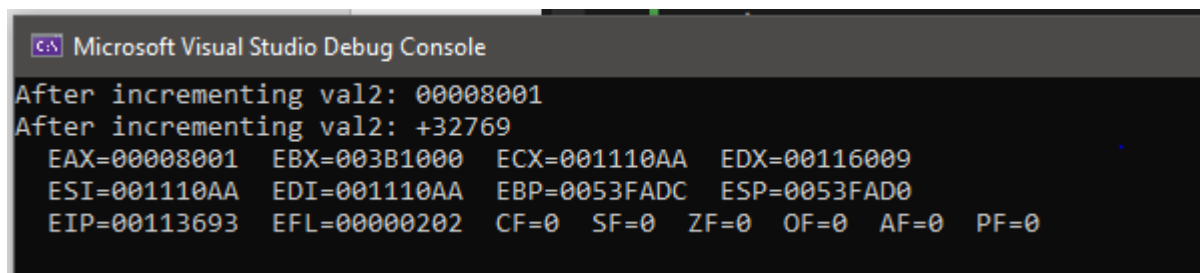
i)



```
;Laiba Jamil (24k-0812)
Include irvine32.inc
.data
    val1 BYTE 10h
    val2 WORD 8000h
    val3 DWORD 0FFFFh
    val4 WORD 7FFFh

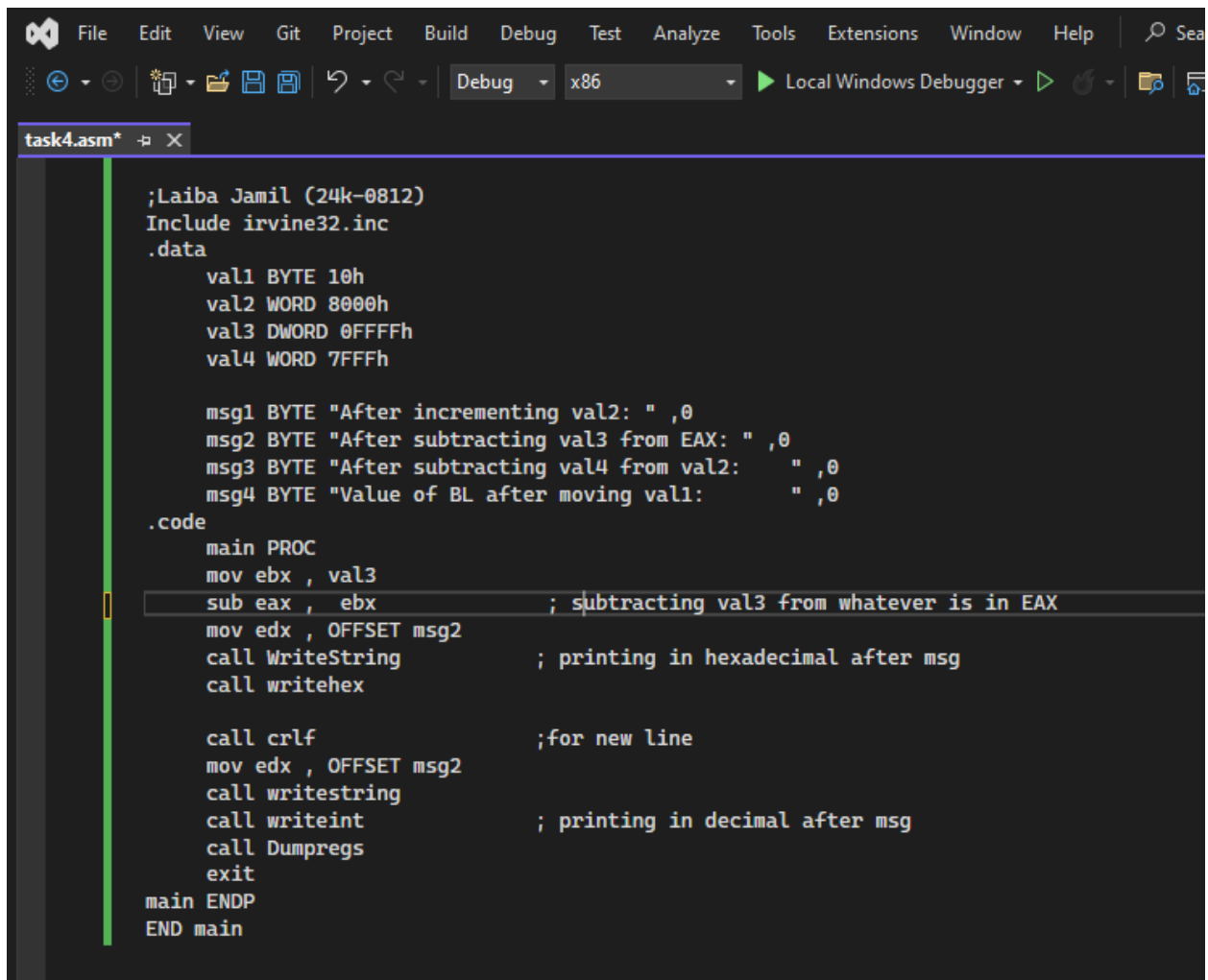
    msg1 BYTE "After incrementing val2: " ,0
    msg2 BYTE "After subtracting val3 from EAX: " ,0
    msg3 BYTE "After subtracting val4 from val2: " ,0
    msg4 BYTE "Value of BL after moving val1: " ,0

.code
main PROC
    mov ax , val2
    inc ax
    movzx eax , ax
    mov edx , OFFSET msg1
    call WriteString
    call writehex           ; printing in hexadecimal after msg
    call crlf              ;next line
    mov edx , OFFSET msg1
    call WriteString
    call writeint           ;printing in decimal after msg
    call Dumpregs
    exit
main ENDP
END main
```



```
Microsoft Visual Studio Debug Console
After incrementing val2: 00008001
After incrementing val2: +32769
EAX=00008001 EBX=003B1000 ECX=001110AA EDX=00116009
ESI=001110AA EDI=001110AA EBP=0053FADC ESP=0053FAD0
EIP=00113693 EFL=00000202 CF=0 SF=0 ZF=0 OF=0 AF=0 PF=0
```

ii)

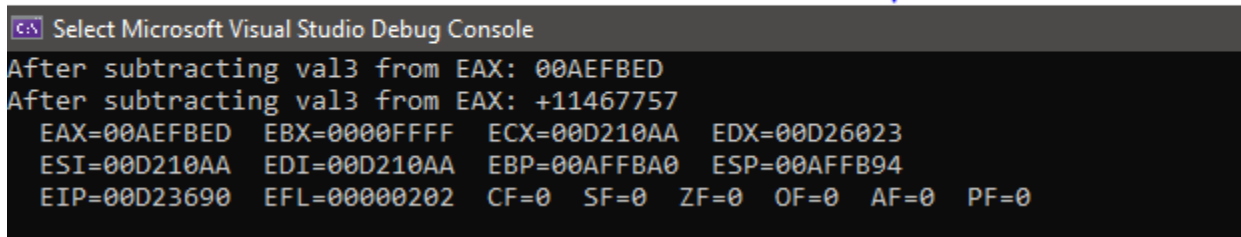


```
;Laiba Jamil (24k-0812)
Include irvine32.inc
.data
    val1 BYTE 10h
    val2 WORD 8000h
    val3 DWORD 0FFFFh
    val4 WORD 7FFFh

    msg1 BYTE "After incrementing val2: " ,0
    msg2 BYTE "After subtracting val3 from EAX: " ,0
    msg3 BYTE "After subtracting val4 from val2: " ,0
    msg4 BYTE "Value of BL after moving val1: " ,0

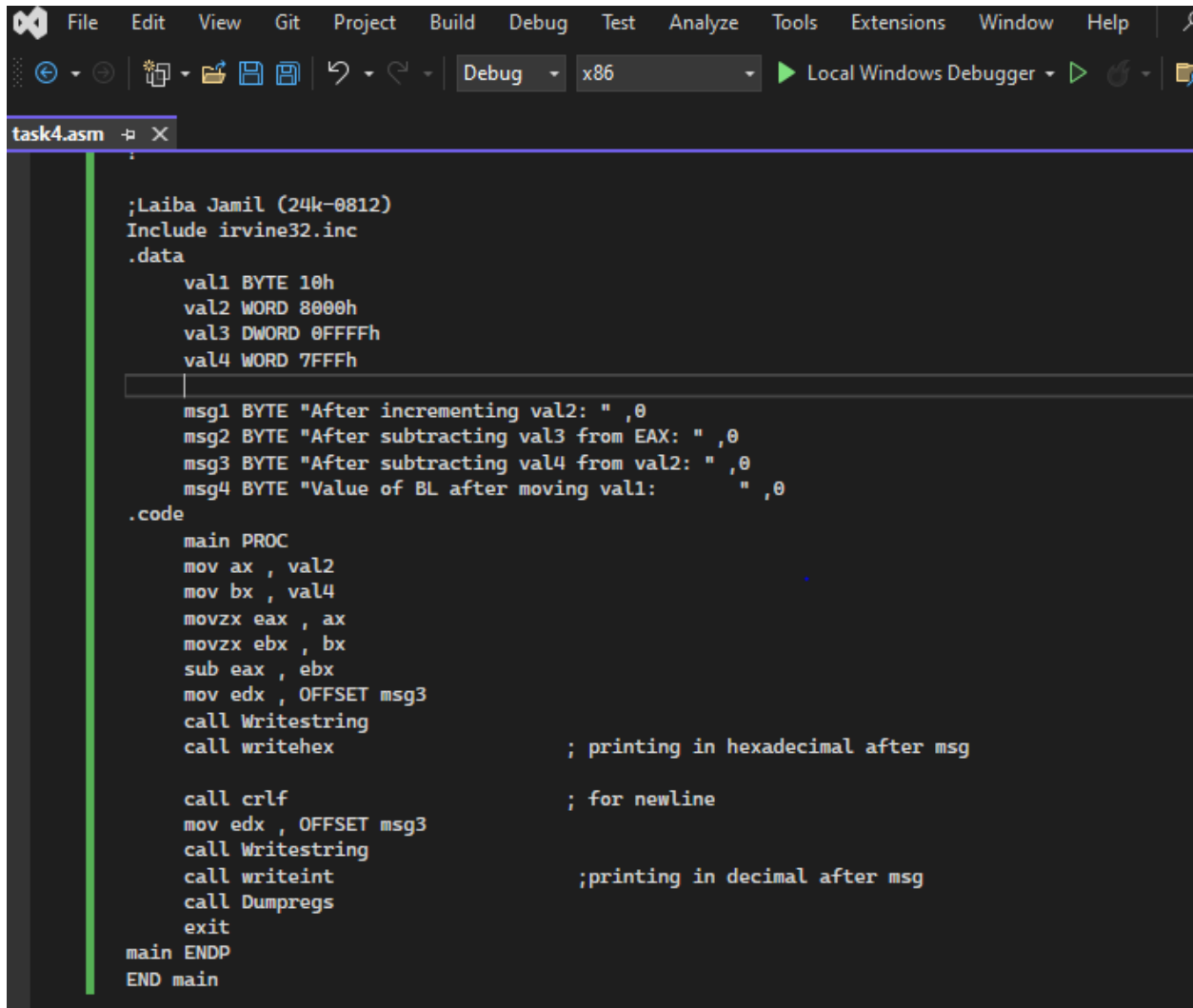
.code
main PROC
    mov ebx, val3
    sub eax, ebx           ; subtracting val3 from whatever is in EAX
    mov edx, OFFSET msg2
    call WriteString       ; printing in hexadecimal after msg
    call writehex

    call crlf              ;for new line
    mov edx, OFFSET msg2
    call writestring
    call writeint          ; printing in decimal after msg
    call Dumpregs
    exit
main ENDP
END main
```



```
Select Microsoft Visual Studio Debug Console
After subtracting val3 from EAX: 00AEFBED
After subtracting val3 from EAX: +11467757
EAX=00AEFBED  EBX=0000FFFF  ECX=00D210AA  EDX=00D26023
ESI=00D210AA  EDI=00D210AA  EBP=00AFFBA0  ESP=00AFFB94
EIP=00D23690  EFL=00000202  CF=0   SF=0   ZF=0   OF=0   AF=0   PF=0
```

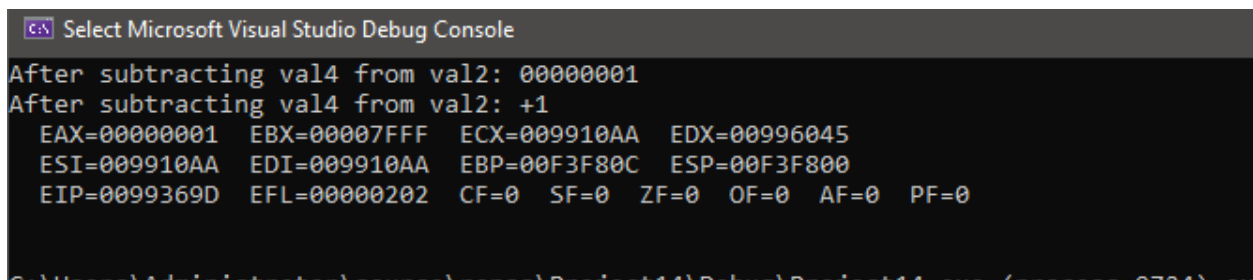
iii)



```
;Laiba Jamil (24k-0812)
Include irvine32.inc
.data
    val1 BYTE 10h
    val2 WORD 8000h
    val3 DWORD 0FFFFh
    val4 WORD 7FFFh

    msg1 BYTE "After incrementing val2: " ,0
    msg2 BYTE "After subtracting val3 from EAX: " ,0
    msg3 BYTE "After subtracting val4 from val2: " ,0
    msg4 BYTE "Value of BL after moving val1: " ,0
.code
main PROC
    mov ax , val2
    mov bx , val4
    movzx eax , ax
    movzx ebx , bx
    sub eax , ebx
    mov edx , OFFSET msg3
    call Writestring
    call writehex                ; printing in hexadecimal after msg

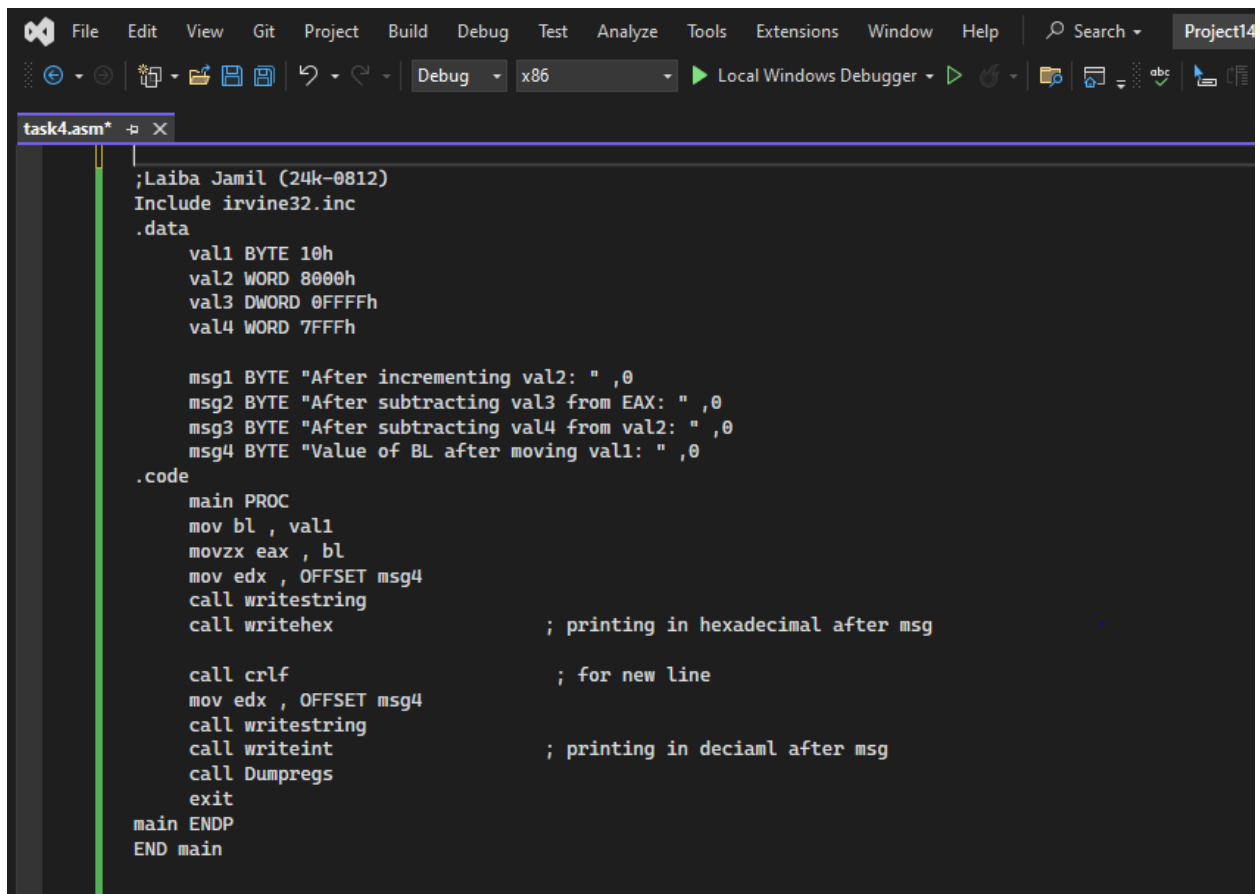
    call crlf                    ; for newline
    mov edx , OFFSET msg3
    call Writestring
    call writeint                ;printing in decimal after msg
    call Dumpregs
    exit
main ENDP
END main
```



```
C:\> Select Microsoft Visual Studio Debug Console

After subtracting val4 from val2: 00000001
After subtracting val4 from val2: +1
EAX=00000001  EBX=00007FFF  ECX=009910AA  EDX=00996045
ESI=009910AA  EDI=009910AA  EBP=00F3F80C  ESP=00F3F800
EIP=0099369D  EFL=00000202  CF=0  SF=0  ZF=0  OF=0  AF=0  PF=0
```

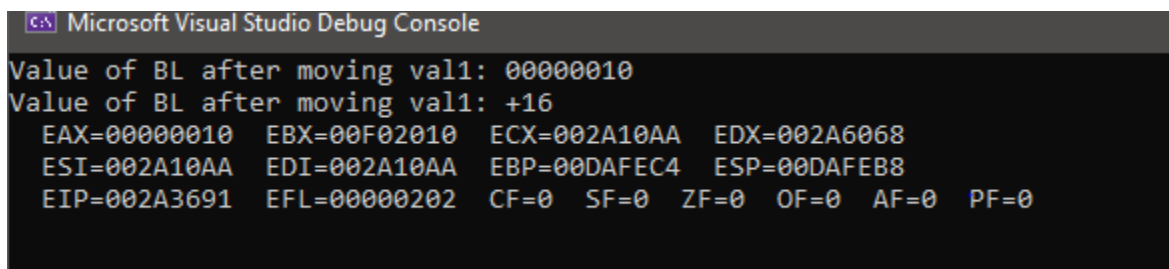
iv)



```
;Laiba Jamil (24k-0812)
Include irvine32.inc
.data
    val1 BYTE 10h
    val2 WORD 8000h
    val3 DWORD 0FFFFh
    val4 WORD 7FFFh

    msg1 BYTE "After incrementing val2: " ,0
    msg2 BYTE "After subtracting val3 from EAX: " ,0
    msg3 BYTE "After subtracting val4 from val2: " ,0
    msg4 BYTE "Value of BL after moving val1: " ,0
.code
main PROC
    mov bl , val1
    movzx eax , bl
    mov edx , OFFSET msg4
    call writestring
    call writehex                ; printing in hexadecimal after msg

    call crlf                    ; for new line
    mov edx , OFFSET msg4
    call writestring
    call writeint                ; printing in decimal after msg
    call Dumpregs
    exit
main ENDP
END main
```



```
C:\> Microsoft Visual Studio Debug Console

Value of BL after moving val1: 00000010
Value of BL after moving val1: +16
EAX=00000010  EBX=00F02010  ECX=002A10AA  EDX=002A6068
ESI=002A10AA  EDI=002A10AA  EBP=00DAFEC4  ESP=00DAFEB8
EIP=002A3691  EFL=00000202  CF=0    SF=0    ZF=0    OF=0    AF=0    PF=0
```