

# COAL LAB TASK # 05

## Mohammad Basil Ali Khan

### 20K-0477

#### Example#01:

```
1 INCLUDE Irvine32.inc
2
3 .data
4     mystring BYTE "hello", 0
5
6 .code
7 main PROC
8     label:
9     mov edx, offset mystring
10    call WriteString
11    jmp label
12
13 exit
14 main ENDP
15 END main
```

#### Example#02:

```
1 INCLUDE Irvine32.inc
2
3 .data
4
5 .code
6 main PROC
7     mov eax, 1
8     start1:
9     add eax, 1
10    cmp eax, 9
11    call DumpRegs
12    je endd
13    jmp start1
14 endd:
15 exit
16 main ENDP
17 END main
```

Microsoft Visual Studio Debug Console

EAX=00000002 EBX=00C62000 ECX=00EF10AA EDX=00EF10AA  
ESI=00EF10AA EDI=00EF10AA EBP=00BDF7D8 ESP=00BDF7CC  
EIP=00EF3670 EFL=00000297 CF=1 SF=1 ZF=0 OF=0 AF=1 PF=1

EAX=00000003 EBX=00C62000 ECX=00EF10AA EDX=00EF10AA  
ESI=00EF10AA EDI=00EF10AA EBP=00BDF7D8 ESP=00BDF7CC  
EIP=00EF3670 EFL=00000297 CF=1 SF=1 ZF=0 OF=0 AF=1 PF=1

EAX=00000004 EBX=00C62000 ECX=00EF10AA EDX=00EF10AA  
ESI=00EF10AA EDI=00EF10AA EBP=00BDF7D8 ESP=00BDF7CC  
EIP=00EF3670 EFL=00000293 CF=1 SF=1 ZF=0 OF=0 AF=1 PF=0

EAX=00000005 EBX=00C62000 ECX=00EF10AA EDX=00EF10AA  
ESI=00EF10AA EDI=00EF10AA EBP=00BDF7D8 ESP=00BDF7CC  
EIP=00EF3670 EFL=00000297 CF=1 SF=1 ZF=0 OF=0 AF=1 PF=1

EAX=00000006 EBX=00C62000 ECX=00EF10AA EDX=00EF10AA  
ESI=00EF10AA EDI=00EF10AA EBP=00BDF7D8 ESP=00BDF7CC  
EIP=00EF3670 EFL=00000293 CF=1 SF=1 ZF=0 OF=0 AF=1 PF=0

EAX=00000007 EBX=00C62000 ECX=00EF10AA EDX=00EF10AA  
ESI=00EF10AA EDI=00EF10AA EBP=00BDF7D8 ESP=00BDF7CC  
EIP=00EF3670 EFL=00000293 CF=1 SF=1 ZF=0 OF=0 AF=1 PF=0

EAX=00000008 EBX=00C62000 ECX=00EF10AA EDX=00EF10AA  
ESI=00EF10AA EDI=00EF10AA EBP=00BDF7D8 ESP=00BDF7CC  
EIP=00EF3670 EFL=00000297 CF=1 SF=1 ZF=0 OF=0 AF=1 PF=1

EAX=00000009 EBX=00C62000 ECX=00EF10AA EDX=00EF10AA  
ESI=00EF10AA EDI=00EF10AA EBP=00BDF7D8 ESP=00BDF7CC  
EIP=00EF3670 EFL=00000246 CF=0 SF=0 ZF=1 OF=0 AF=0 PF=1

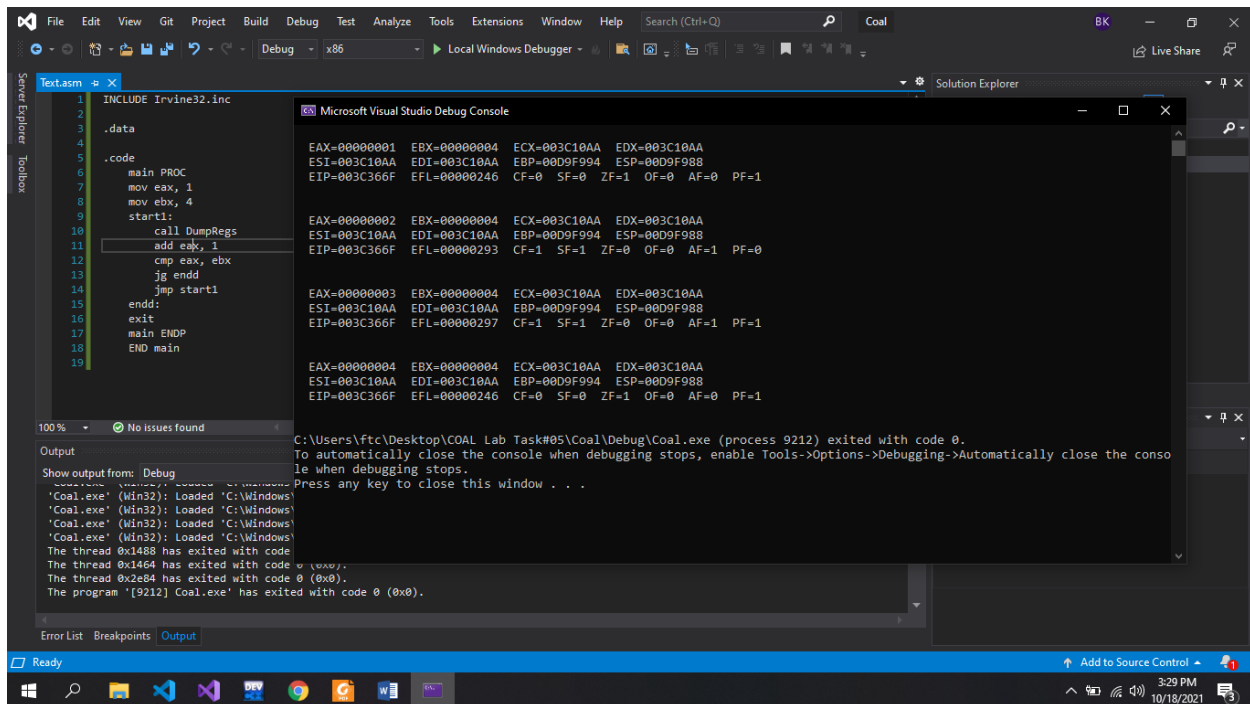
Output

Show output from: Debug

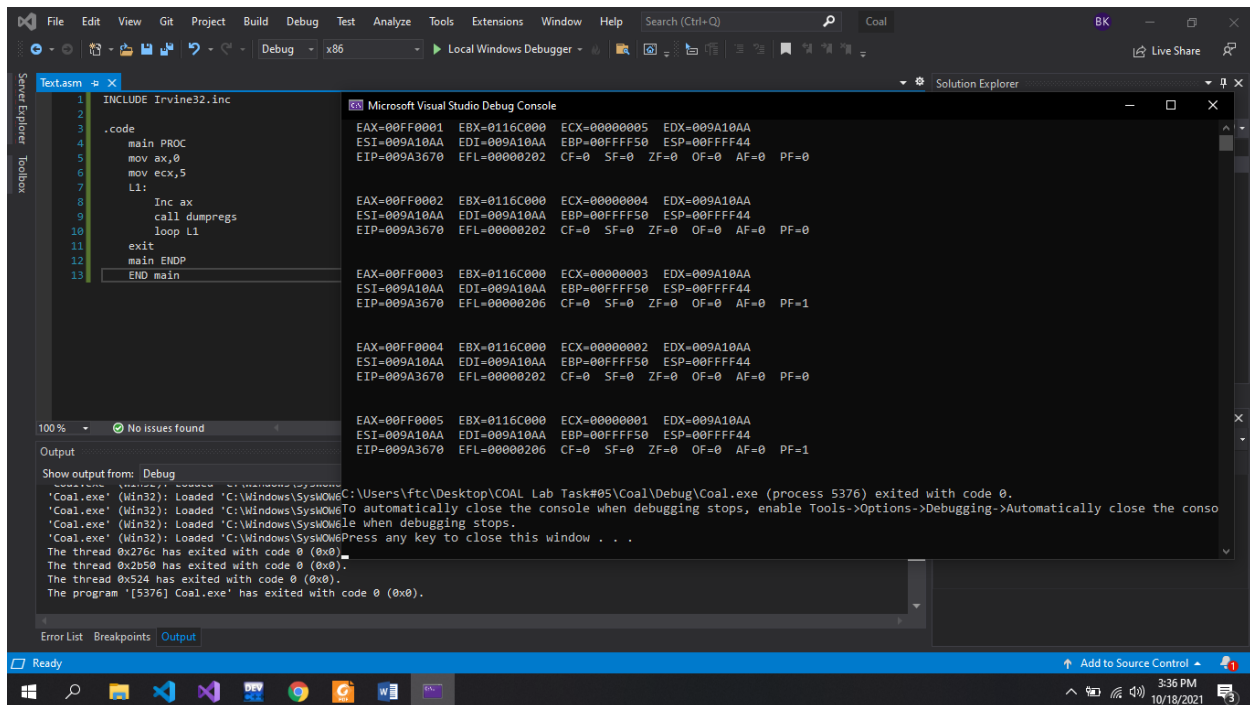
'Coal.exe' (Win32): Loaded 'C:\Windows\System32\user32.dll'.  
'Coal.exe' (Win32): Loaded 'C:\Windows\System32\GDI32.dll'.  
'Coal.exe' (Win32): Loaded 'C:\Windows\System32\SHELL32.dll'.  
'Coal.exe' (Win32): Loaded 'C:\Windows\System32\ole32.dll'.  
'Coal.exe' (Win32): Loaded 'C:\Windows\System32\RPCRT4.dll'.  
'Coal.exe' (Win32): Loaded 'C:\Windows\System32\ADVAPI32.dll'.  
'Coal.exe' (Win32): Loaded 'C:\Windows\System32\USER32.dll'.  
'Coal.exe' (Win32): Loaded 'C:\Windows\System32\GDI32.dll'.  
'Coal.exe' (Win32): Loaded 'C:\Windows\System32\SHELL32.dll'.  
'Coal.exe' (Win32): Loaded 'C:\Windows\System32\ole32.dll'.  
'Coal.exe' (Win32): Loaded 'C:\Windows\System32\RPCRT4.dll'.  
'Coal.exe' (Win32): Loaded 'C:\Windows\System32\ADVAPI32.dll'.  
The thread 0x1c2c has exited with code 0 (0x0).  
The thread 0x25c has exited with code 0 (0x0).  
The thread 0x2e3c has exited with code 0 (0x0).  
The program '[9288] Coal.exe' has exited with code 0 (0x0).

C:\Users\Ftc\Desktop\COAL Lab Task#05\Coal\Debug\Coal.exe (process 9288) exited with code 0.  
To automatically close the console when debugging stops, enable Tools->Options->Debugging->Automatically close the console when debugging stops.

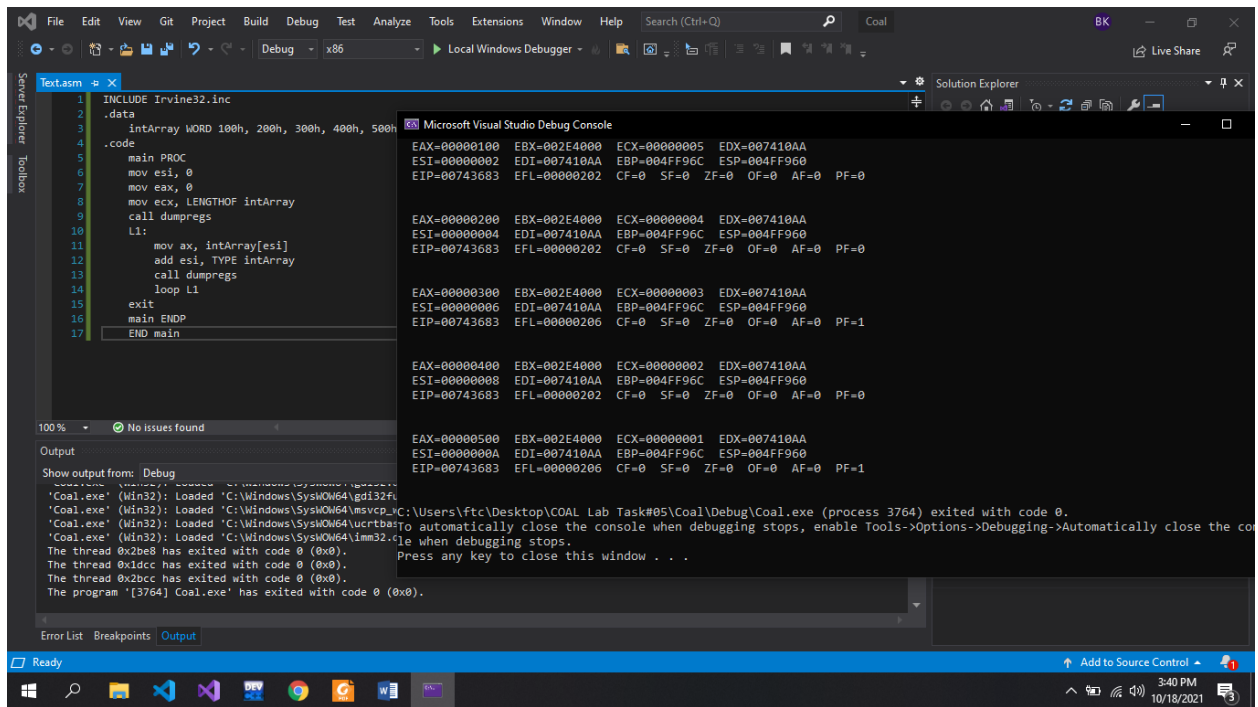
## Task#01:



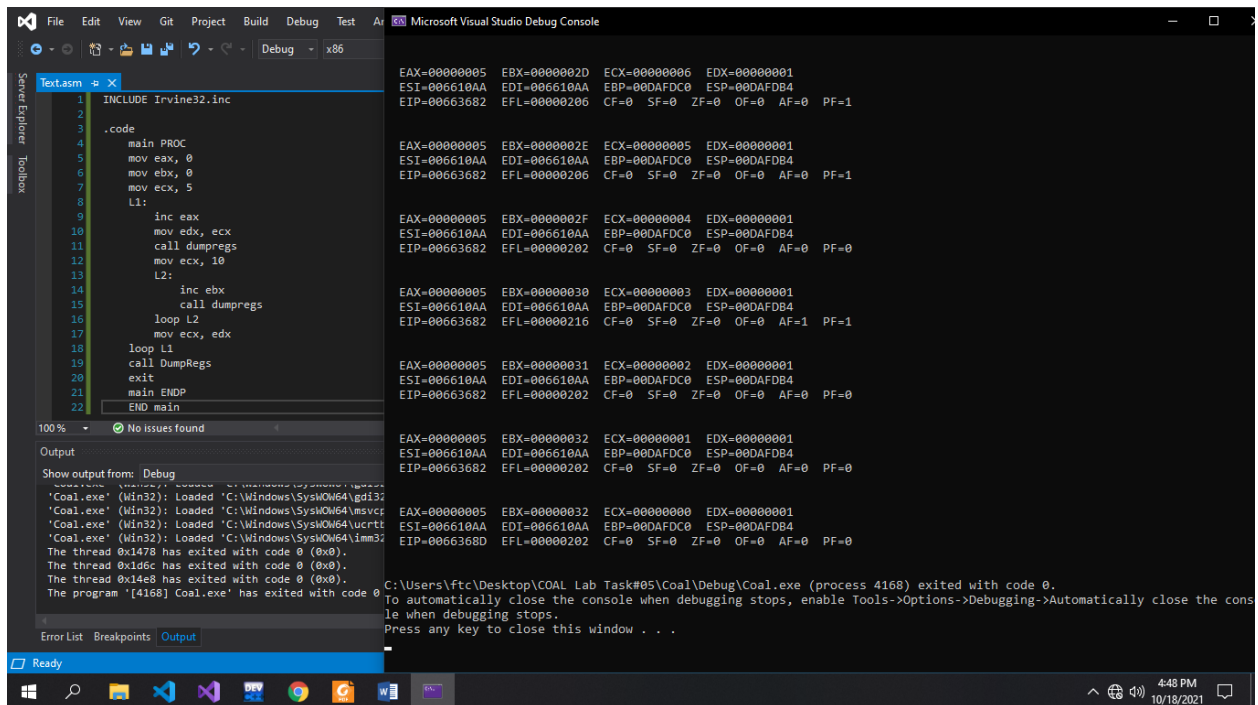
## Example#01:



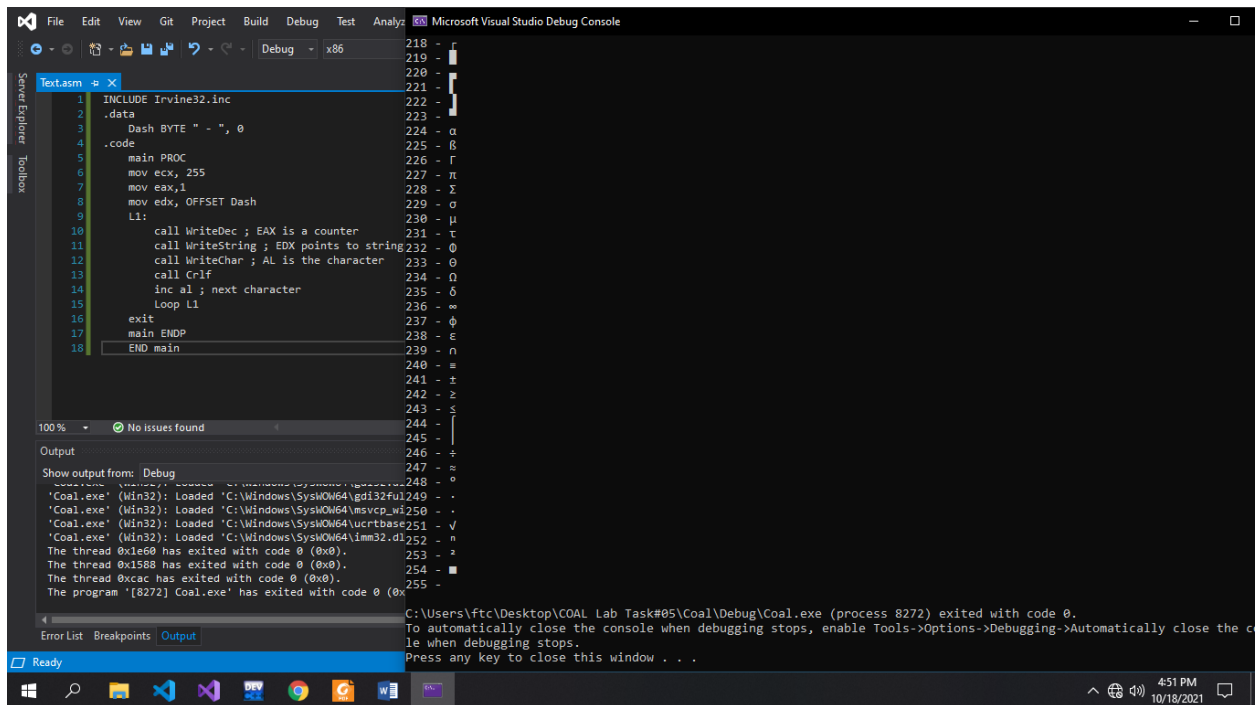
## Example#02:



## Example#03:



## Example#04:

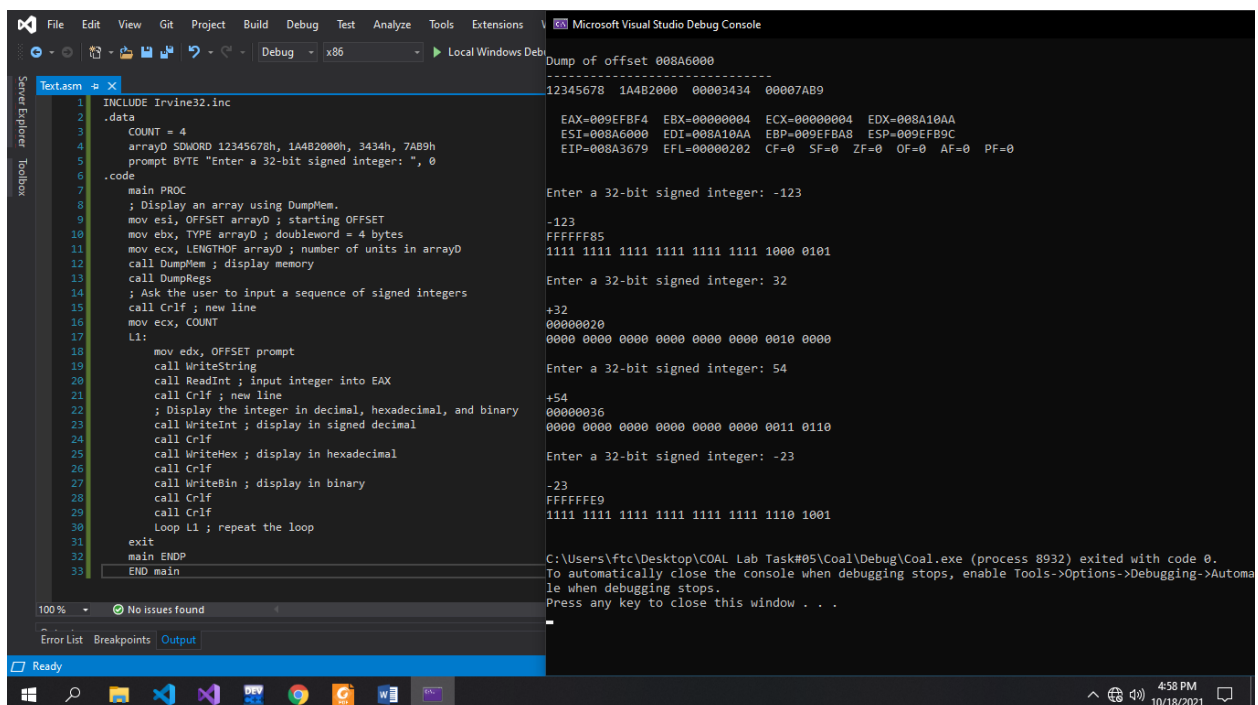


The screenshot shows the Visual Studio IDE with the assembly file `Text.asm` open in the Text Editor. The assembly code is as follows:

```
1 INCLUDE Irvine32.inc
2 .data
3     Dash BYTE " - ", 0
4 .code
5 main PROC
6     mov ecx, 255
7     mov eax, 1
8     mov edx, OFFSET Dash
9     L1:
10    call WriteDec ; EAX is a counter
11    call WriteString ; EDX points to string
12    call WriteChar ; AL is the character
13    call CrLf
14    inc al ; next character
15    Loop L1
16    exit
17 main ENDP
18 END main
```

The Debug Console shows the output of the program, which is a series of dashes: `-----`. The console also displays the exit code of the program: `C:\Users\ftc\Desktop\COAL Lab Task#05\Coal\Debug\Coal.exe (process 8272) exited with code 0.`

## Example#05:

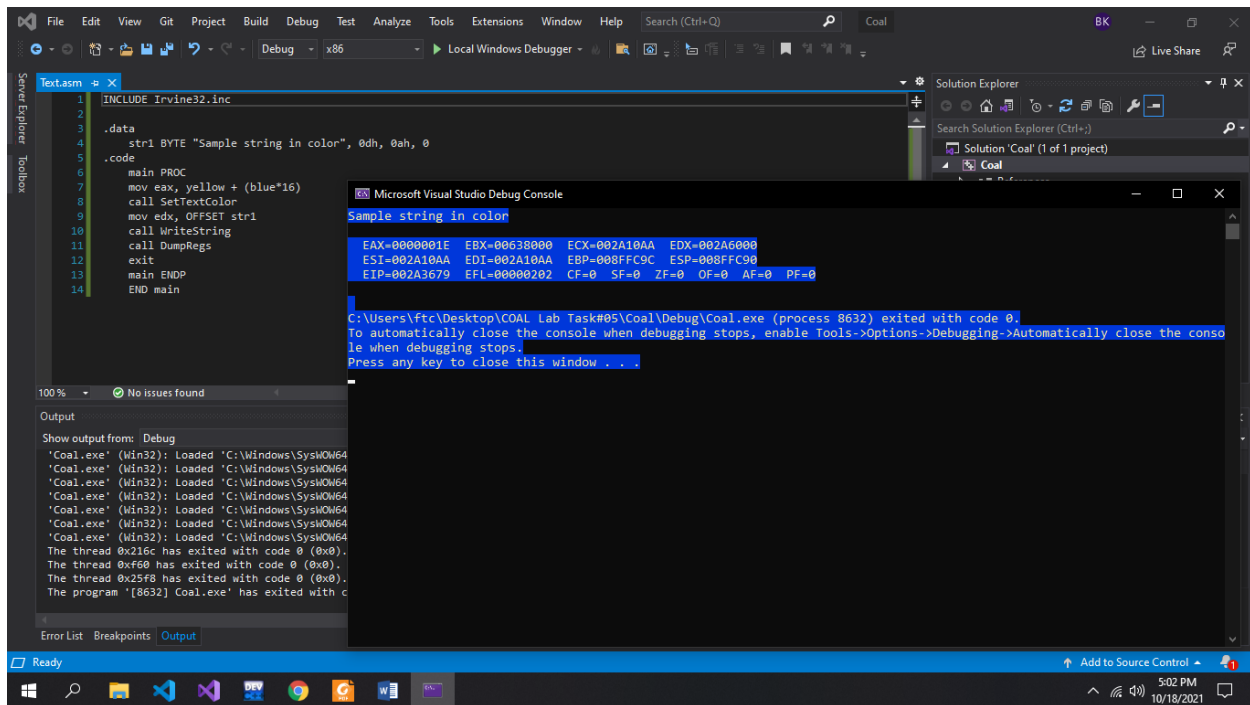


The screenshot shows the Visual Studio IDE with the assembly file `Text.asm` open in the Text Editor. The assembly code is as follows:

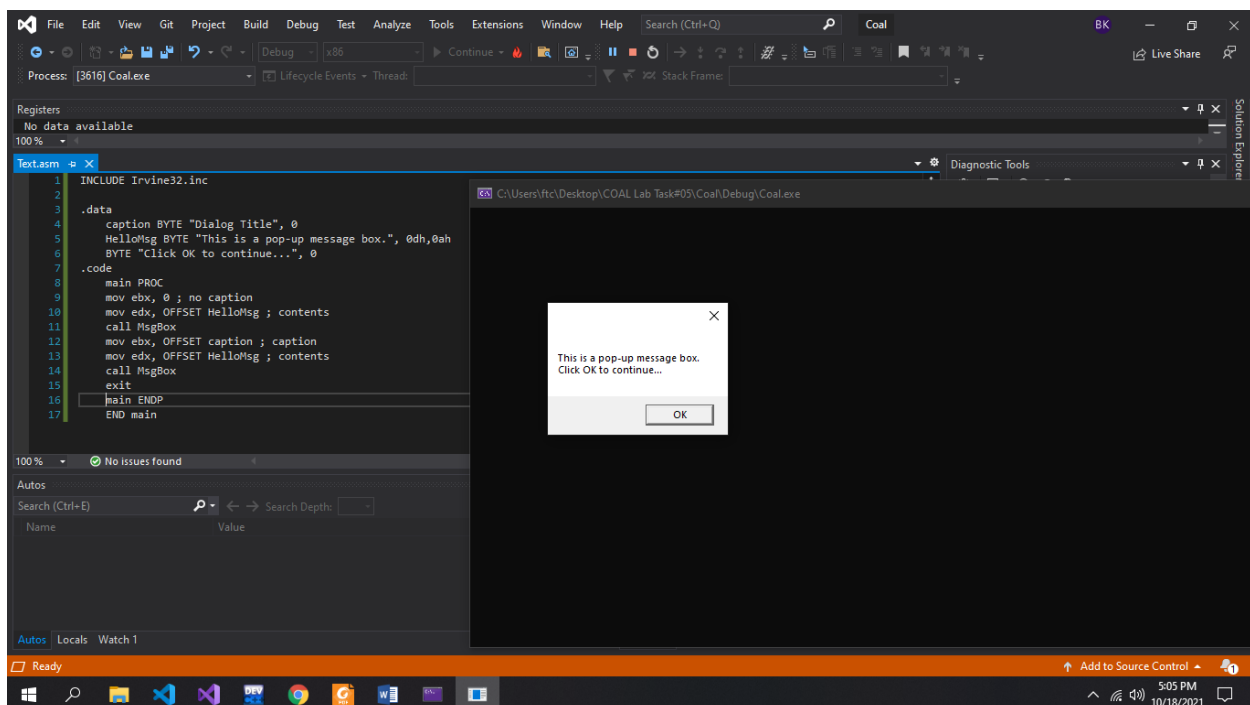
```
1 INCLUDE Irvine32.inc
2 .data
3     COUNT = 4
4     arrayD SDWORD 12345678h, 1A4B2000h, 3434h, 7AB9h
5     prompt BYTE "Enter a 32-bit signed integer: ", 0
6 .code
7 main PROC
8     ; Display an array using DumpMem
9     mov esi, OFFSET arrayD ; starting OFFSET
10    mov ebx, TYPE arrayD ; doubleword = 4 bytes
11    mov ecx, LENGTHOF arrayD ; number of units in arrayD
12    call DumpMem ; display memory
13    call DumpRegs
14    ; Ask the user to input a sequence of signed integers
15    call CrLf ; new line
16    mov ecx, COUNT
17    L1:
18    mov edx, OFFSET prompt
19    call WriteString
20    call ReadInt ; input integer into EAX
21    call CrLf ; new line
22    ; Display the integer in decimal, hexadecimal, and binary
23    call WriteInt ; display in signed decimal
24    call CrLf
25    call WriteHex ; display in hexadecimal
26    call CrLf
27    call WriteBin ; display in binary
28    call CrLf
29    Loop L1 ; repeat the loop
30    exit
31 main ENDP
32 END main
```

The Debug Console shows the output of the program, which is a series of dashes: `-----`. The console also displays the exit code of the program: `C:\Users\ftc\Desktop\COAL Lab Task#05\Coal\Debug\Coal.exe (process 8932) exited with code 0.`

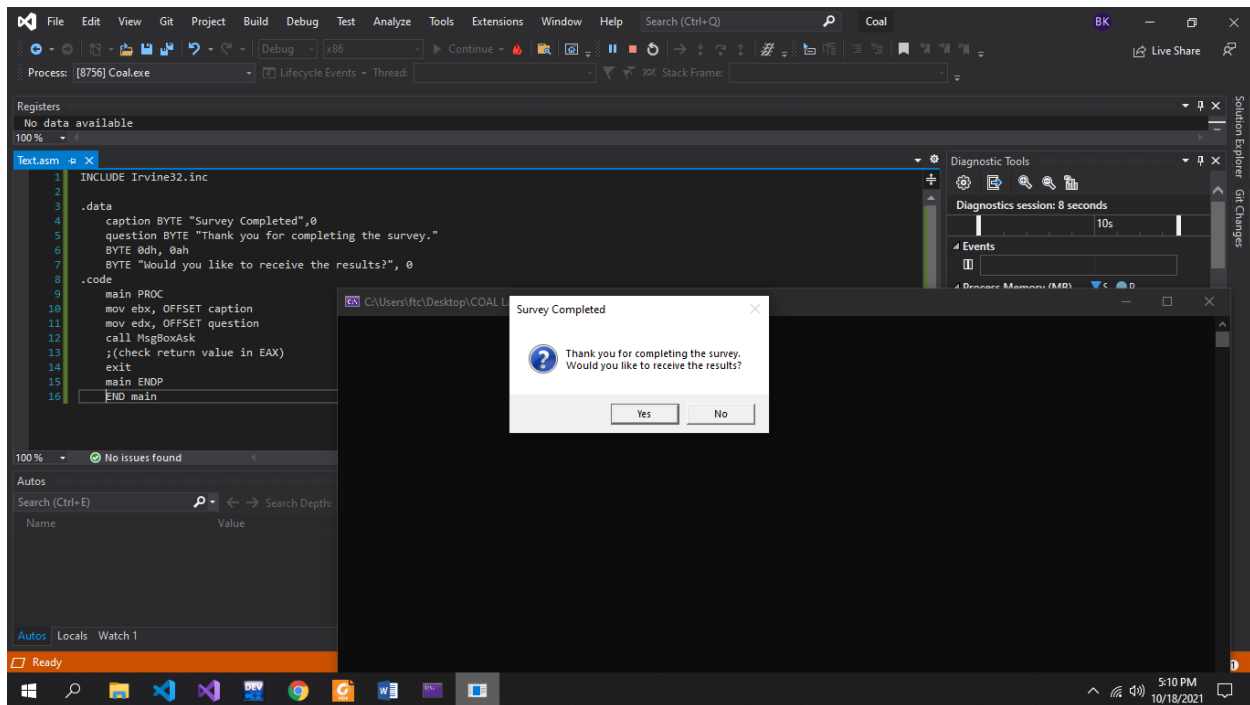
## Example#06:



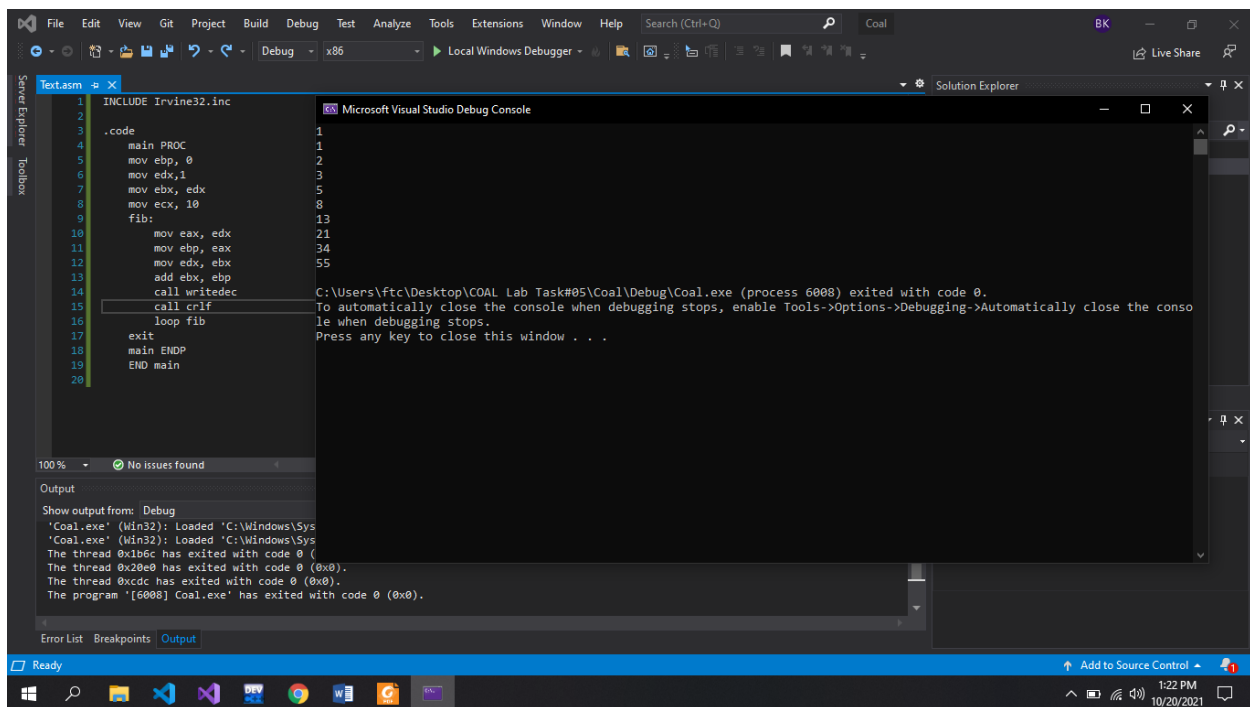
## Example#07:



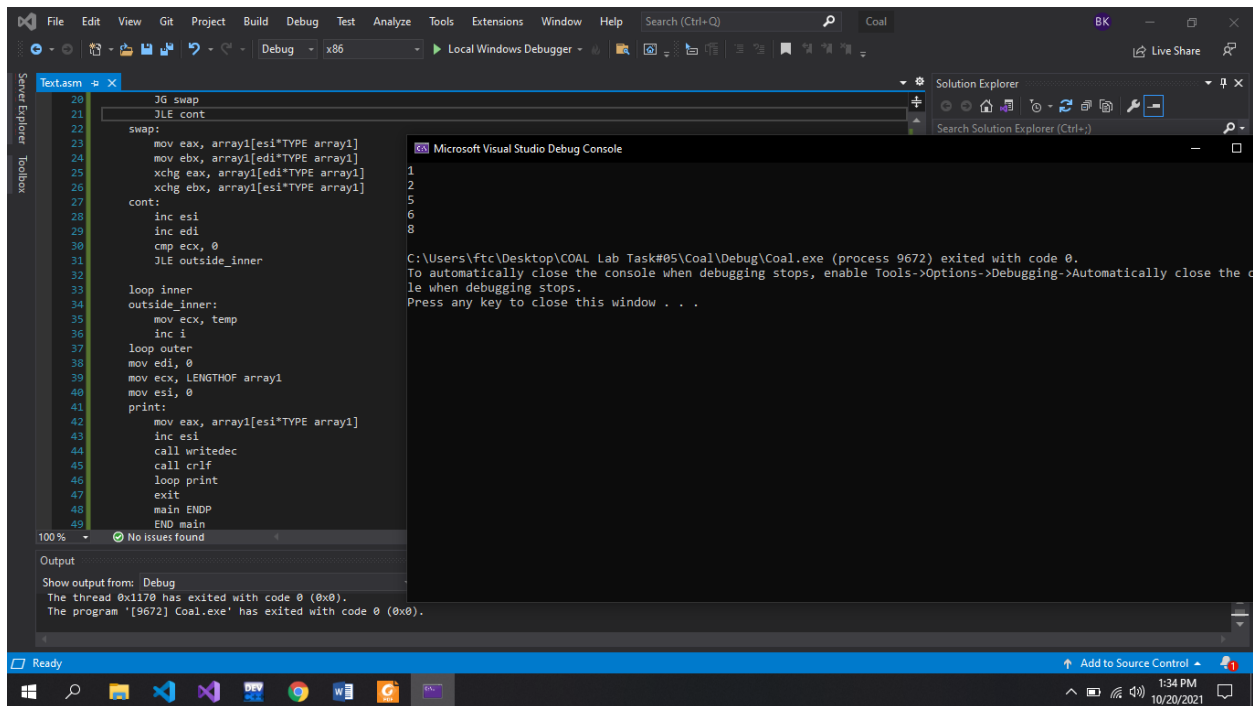
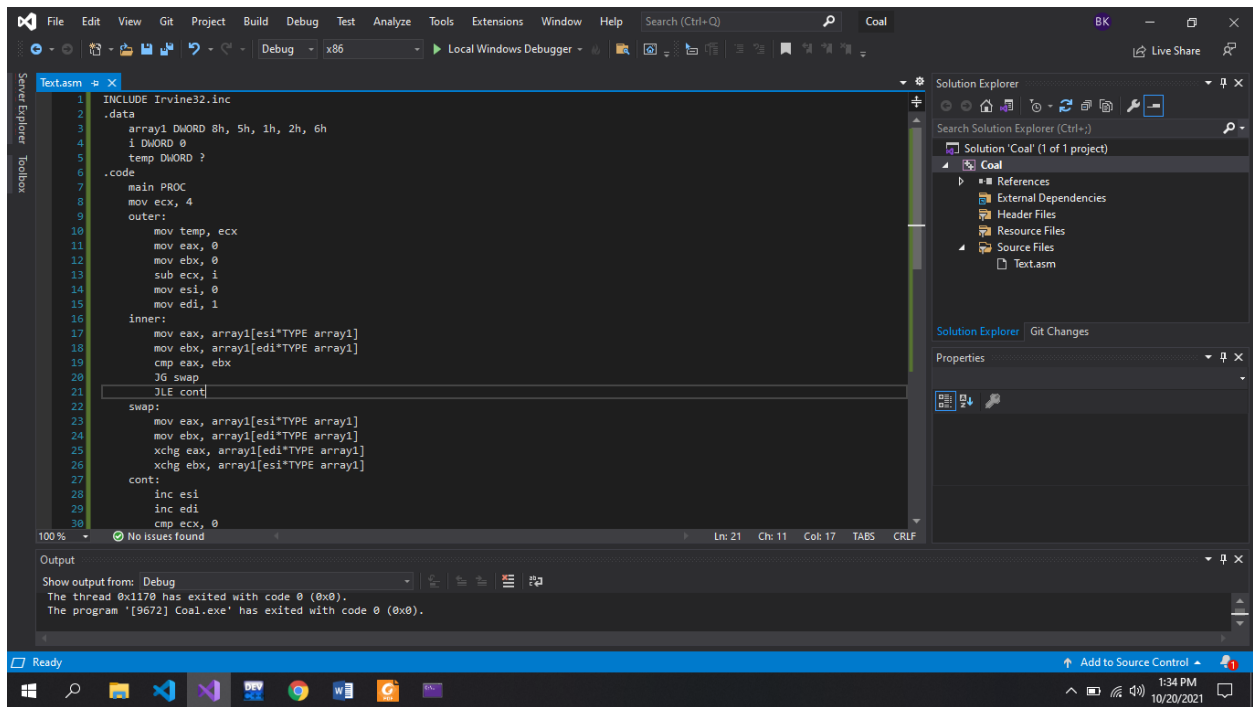
## Example#08:



## Task#01:



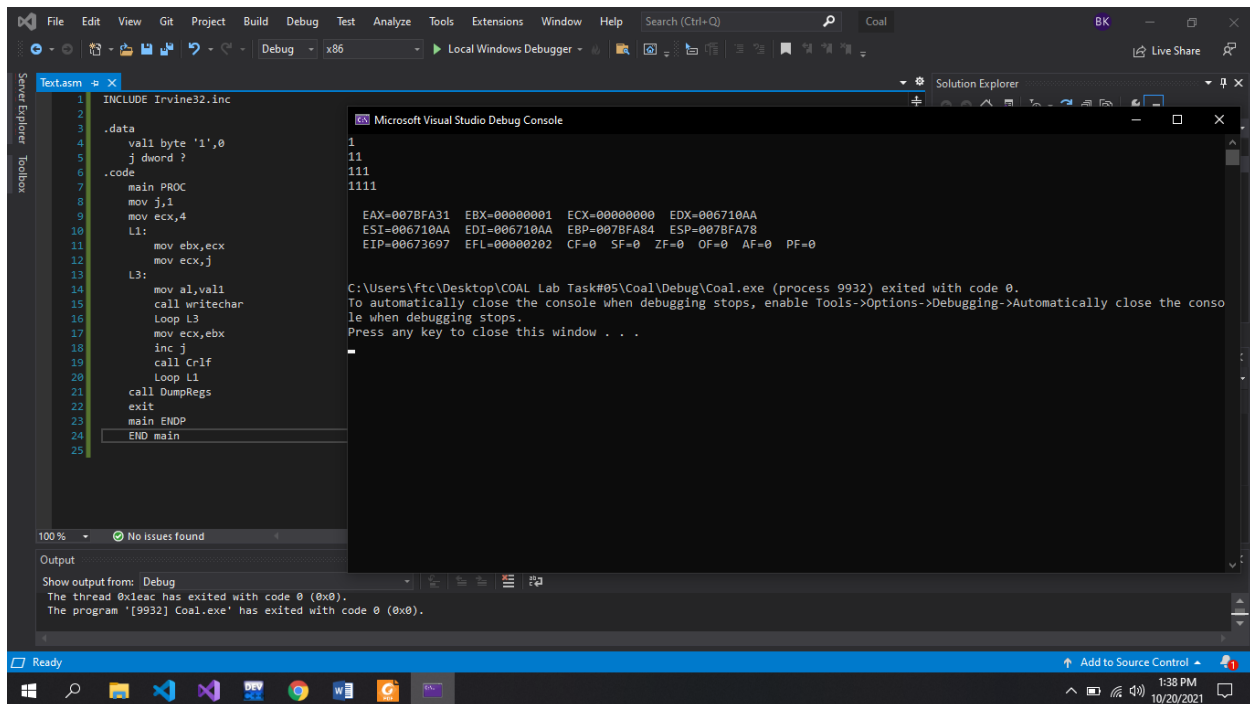
## Task#02:





## Task#03:

(a)



The screenshot shows the Visual Studio IDE with the assembly file `Text.asm` open. The code includes `Irvine32.inc` and defines a `main` procedure. The assembly code is as follows:

```
1 INCLUDE Irvine32.inc
2
3 .data
4     val1 byte '1',0
5     i dword ?
6
7 .code
8 main PROC
9     mov j,1
10    mov ecx,4
11 L1:  mov ebx,ecx
12    mov ecx,j
13
14 L3:  mov al,val1
15    call writechar
16    Loop L3
17    inc j
18    call CrLf
19    Loop L1
20
21    call DumpRegs
22    exit
23 main ENDP
24 END main
25
```

The Microsoft Visual Studio Debug Console shows the following output:

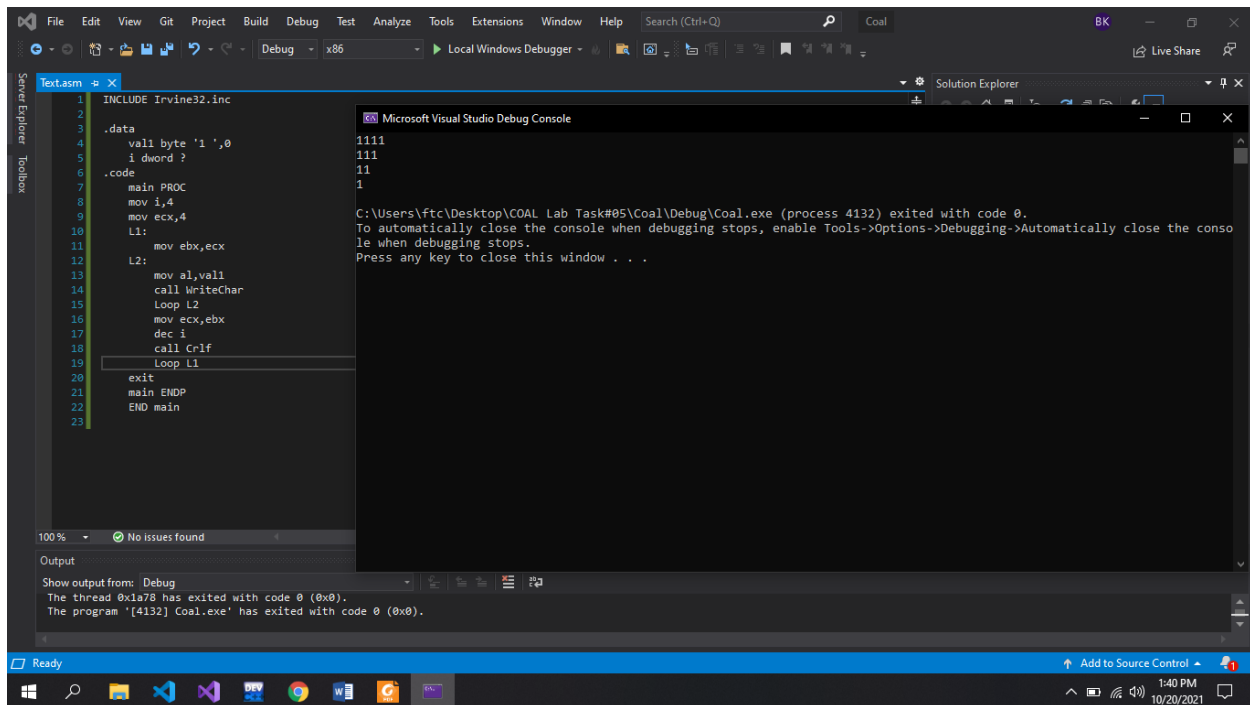
```
1
11
111
1111
EAX=007BFA31  EBX=00000001  ECX=00000000  EDX=006710AA
ESI=006710AA  EDI=006710AA  EBP=007BFA84  ESP=007BFA78
EIP=00673697  EFL=00000202  CF=0  SF=0  ZF=0  OF=0  AF=0  PF=0

C:\Users\ftc\Desktop\COAL Lab Task#05\Coal\Debug\Coal.exe (process 9932) exited with code 0.
To automatically close the console when debugging stops, enable Tools->Options->Debugging->Automatically close the console when debugging stops.
Press any key to close this window . . .
```

The Output window shows the following messages:

```
Show output from: Debug
The thread 0x1eac has exited with code 0 (0x0).
The program '[9932] Coal.exe' has exited with code 0 (0x0).
```

(b)



The screenshot shows the Visual Studio IDE with the assembly file `Text.asm` open. The code includes `Irvine32.inc` and defines a `main` procedure. The assembly code is as follows:

```
1 INCLUDE Irvine32.inc
2
3 .data
4     val1 byte '1 ',0
5     i dword ?
6
7 .code
8 main PROC
9     mov i,4
10    mov ecx,4
11 L1:  mov ebx,ecx
12
13 L2:  mov al,val1
14    call WriteChar
15    Loop L2
16    mov ecx,ebx
17    dec i
18    call CrLf
19    Loop L1
20
21    exit
22 main ENDP
23 END main
24
```

The Microsoft Visual Studio Debug Console shows the following output:

```
1111
1111
111
11
1

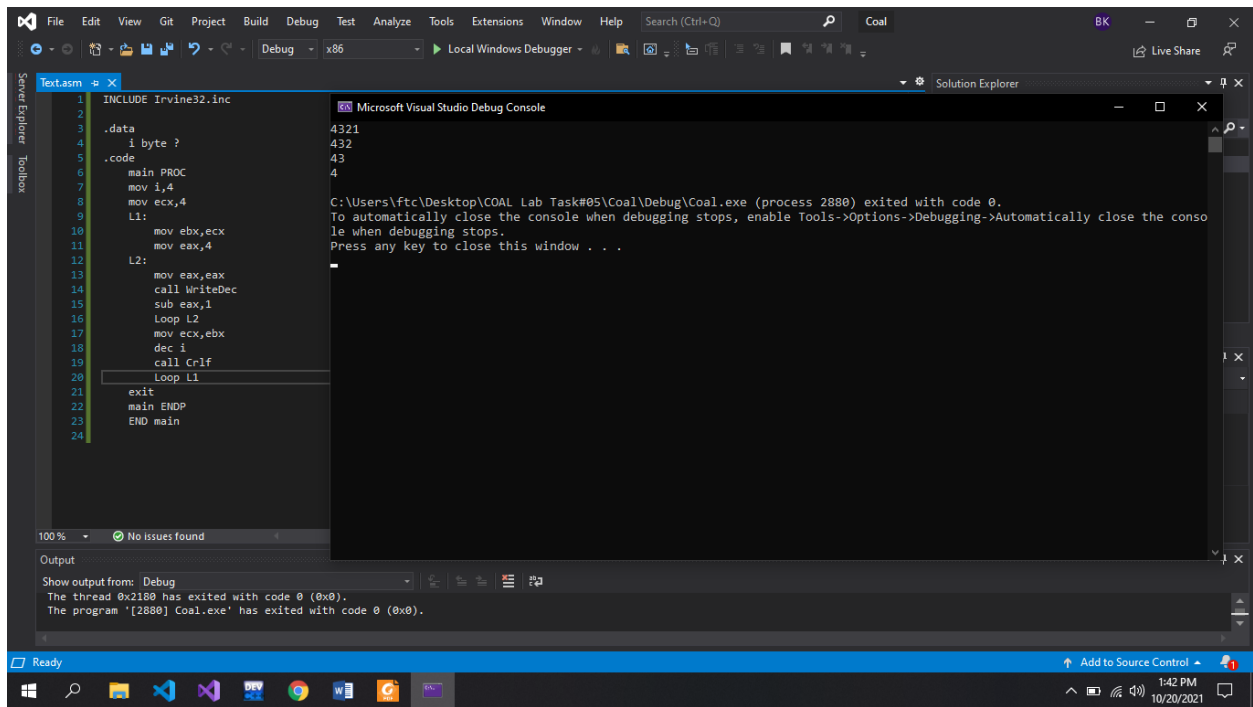
C:\Users\ftc\Desktop\COAL Lab Task#05\Coal\Debug\Coal.exe (process 4132) exited with code 0.
To automatically close the console when debugging stops, enable Tools->Options->Debugging->Automatically close the console when debugging stops.
Press any key to close this window . . .
```

The Output window shows the following messages:

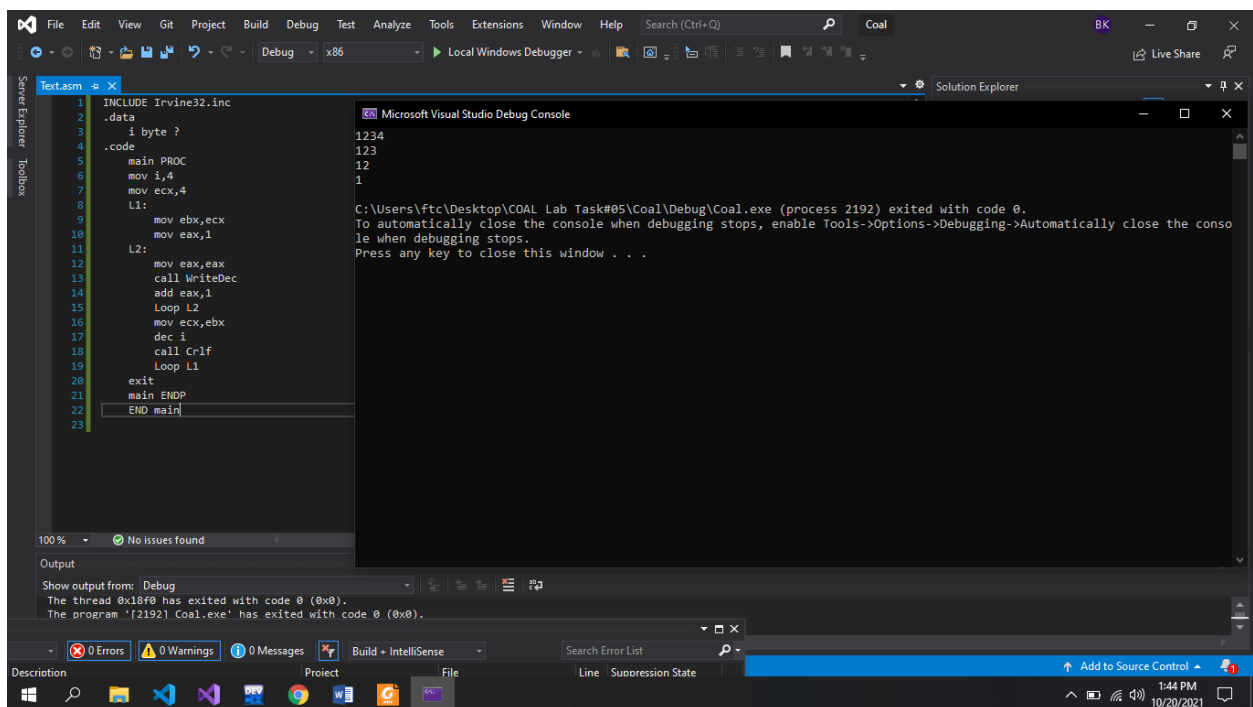
```
Show output from: Debug
The thread 0x1a78 has exited with code 0 (0x0).
The program '[4132] Coal.exe' has exited with code 0 (0x0).
```



(c)



(d)



## Task#04:

The screenshot shows the Visual Studio Code editor with the file 'Text.asm' open. The code is an x86 assembly program that prompts the user for employee information and calculates the total annual salary. The code is as follows:

```
1 INCLUDE Irvine32.inc
2
3 .data
4     sum dword 0h
5     AnnualSalary DWORD 5 DUP(?)
6     prompt BYTE "Enter a Employee Id: ", 0
7     prompt1 BYTE "Enter a Employee name: ", 0
8     prompt2 BYTE "Enter Year of Birth ", 0
9     prompt3 BYTE "Enter Annual Salary ", 0
10    prompt4 BYTE "Total Annual Salary ", 0
11    id DWORD 5 DUP(?)
12    myname BYTE 20 DUP(?)
13    Byear DWORD 5 DUP(?)
14    salary DWORD 5 DUP(?)
15
16 .code
17 main PROC
18     mov ebx, 0
19     mov ecx, 5
20     mov edi, ecx
21     L1:
22         mov edx, OFFSET prompt
23         call WriteString
24         call ReadHex
25         mov id[ebx], eax
26         mov edx, OFFSET prompt1
27         call WriteString
28         mov ecx, OFFSET myname
29         mov ecx, sizeof myname
30         call ReadString
31         mov edx, OFFSET prompt2
32         call WriteString
33         call ReadHex
34         mov Byear[ebx], eax
35         mov edx, OFFSET prompt3
36         call WriteString
37         call ReadHex
38         mov salary[ebx], eax
39         add sum, eax
40         inc ebx
41         dec edi
42         loop L1
43     call crlf
44     mov edx, OFFSET prompt4
45     call WriteString
46     mov eax, sum
47     call WriteDec
48     exit
49 main ENDP
50 END main
```

The Solution Explorer on the right shows the project structure for 'Coal' (1 of 1 project), including References, External Dependencies, Header Files, Resource Files, and Source Files (Text.asm). The Properties window is also visible.

The screenshot shows the Visual Studio Code editor with the file 'Text.asm' open. The code is the same as in the previous screenshot. The Microsoft Visual Studio Debug Console on the right shows the output of the program, which is a series of prompts and user input, followed by the total annual salary calculation.

```
Enter a Employee Id: 20k0477
Enter a Employee name: Basil
Enter Year of Birth 2001
Enter Annual Salary 20000
Enter a Employee Id: 20k1067
Enter a Employee name: Shahzaib
Enter Year of Birth 2000
Enter Annual Salary 30000
Enter a Employee Id: 20k0488
Enter a Employee name: Sohaib
Enter Year of Birth 2002
Enter Annual Salary 40000
Enter a Employee Id: 20k1902
Enter a Employee name: Khuwaja
Enter Year of Birth 1999
Enter Annual Salary 50000
Enter a Employee Id: 20k6789
Enter a Employee name: Ahad
Enter Year of Birth 2001
Enter Annual Salary 60000

Total Annual Salary 1310720

C:\Users\ftc\Desktop\COAL Lab Task#05\Coal\Debug\Coal.exe (process 652) exited with code 0.
To automatically close the console when debugging stops, enable Tools->Options->Debugging->Automatically close the console when debugging stops.
Press any key to close this window . . .
```

## Task#05:

```
1 INCLUDE Irvine32.inc
2
3 .data
4     source BYTE 'b','a','s','i','l','k','h','a','n',0
5     target BYTE LENGTHOF source DUP(?)
6
7 .code
8 main PROC
9     mov ecx,lengthof source
10
11     L1:
12     mov al,source[ecx-1]
13     mov target[ecx-1],al
14     loop L1
15     mov edx,offset target
16     call WriteString
17     call DumpRegs
18     exit
19 main ENDP
20 END main
```

Microsoft Visual Studio Debug Console

basilkhan

EAX=0073F862 EBX=0051D000 ECX=00000000 EDX=00A2600A  
ESI=00A210AA EDI=00A210AA EBP=0073F81C ESP=0073F810  
EIP=00A23682 EFL=00000202 CF=0 SF=0 ZF=0 OF=0 AF=0 PF=0

C:\Users\ftc\Desktop\COAL Lab Task#05\Coal\Debug\Coal.exe (process 8536) exited with code 0.  
To automatically close the console when debugging stops, enable Tools->Options->Debugging->Automatically close the console when debugging stops.  
Press any key to close this window . . .

Output

Show output from: Debug

'Coal.exe' (Win32): Loaded 'C:\Windows\System64\gdi32full.dll'.  
'Coal.exe' (Win32): Loaded 'C:\Windows\System64\msvcrt.dll'.  
'Coal.exe' (Win32): Loaded 'C:\Windows\System64\user32.dll'.  
'Coal.exe' (Win32): Loaded 'C:\Windows\System64\ole32.dll'.  
The thread 0x1c48 has exited with code 0 (0x0).  
The thread 0x17d8 has exited with code 0 (0x0).  
The thread 0x276c has exited with code 0 (0x0).  
The program 'f55241 Coal.exe' has exited with code 0 (0x0).

## Task#06:

```
1 INCLUDE Irvine32.inc
2
3 .data
4     array byte 3,5,6,7
5
6 .code
7 main PROC
8     mov ecx,(lengthof array/2)
9     mov esi,(lengthof array-1)
10     mov edx,0
11
12     L1:
13     mov al,array[esi]
14     mov bl,array[edx]
15     mov array[esi],bl
16     dec esi
17     inc edx
18     loop L1
19     mov ecx,(lengthof array)
20     mov edx,0
21     mov eax,0
22     L2:
23     mov al,array[edx]
24     call WriteDec
25     inc edx
26     loop L2
27     call DumpRegs
28     exit
29 main ENDP
30 END main
```

Microsoft Visual Studio Debug Console

7653

EAX=00000003 EBX=00EE6005 ECX=00000000 EDX=00000004  
ESI=00000001 EDI=002D10AA EBP=010FFE44 ESP=010FFE38  
EIP=002D36AD EFL=00000202 CF=0 SF=0 ZF=0 OF=0 AF=0 PF=0

C:\Users\ftc\Desktop\COAL Lab Task#05\Coal\Debug\Coal.exe (process 5524) exited with code 0.  
To automatically close the console when debugging stops, enable Tools->Options->Debugging->Automatically close the console when debugging stops.  
Press any key to close this window . . .

Output

Show output from: Debug

The thread 0x112c has exited with code 0 (0x0).  
The thread 0x514 has exited with code 0 (0x0).  
The program 'f55241 Coal.exe' has exited with code 0 (0x0).