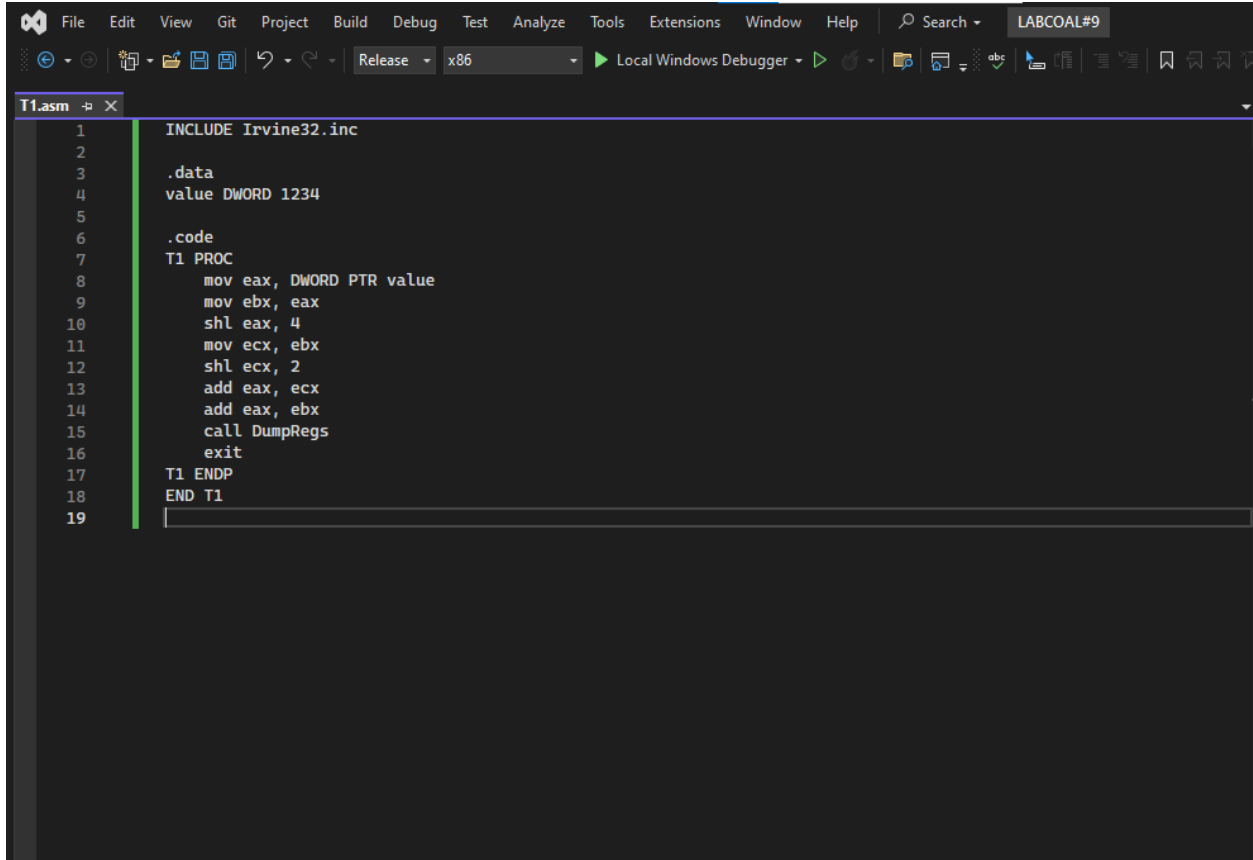# COAL LAB # 9

Muhammad Baqar Laghari
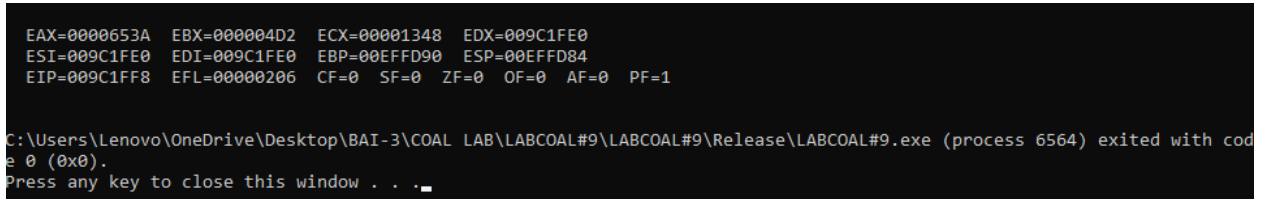**BAI-3A**
24K-0006

Task 1:


```
1    INCLUDE Irvine32.inc
2
3    .data
4    value DWORD 1234
5
6    .code
7    T1 PROC
8        mov eax, DWORD PTR value
9        mov ebx, eax
10       shl eax, 4
11       mov ecx, ebx
12       shl ecx, 2
13       add eax, ecx
14       add eax, ebx
15       call DumpRegs
16       exit
17   T1 ENDP
18   END T1
19
```
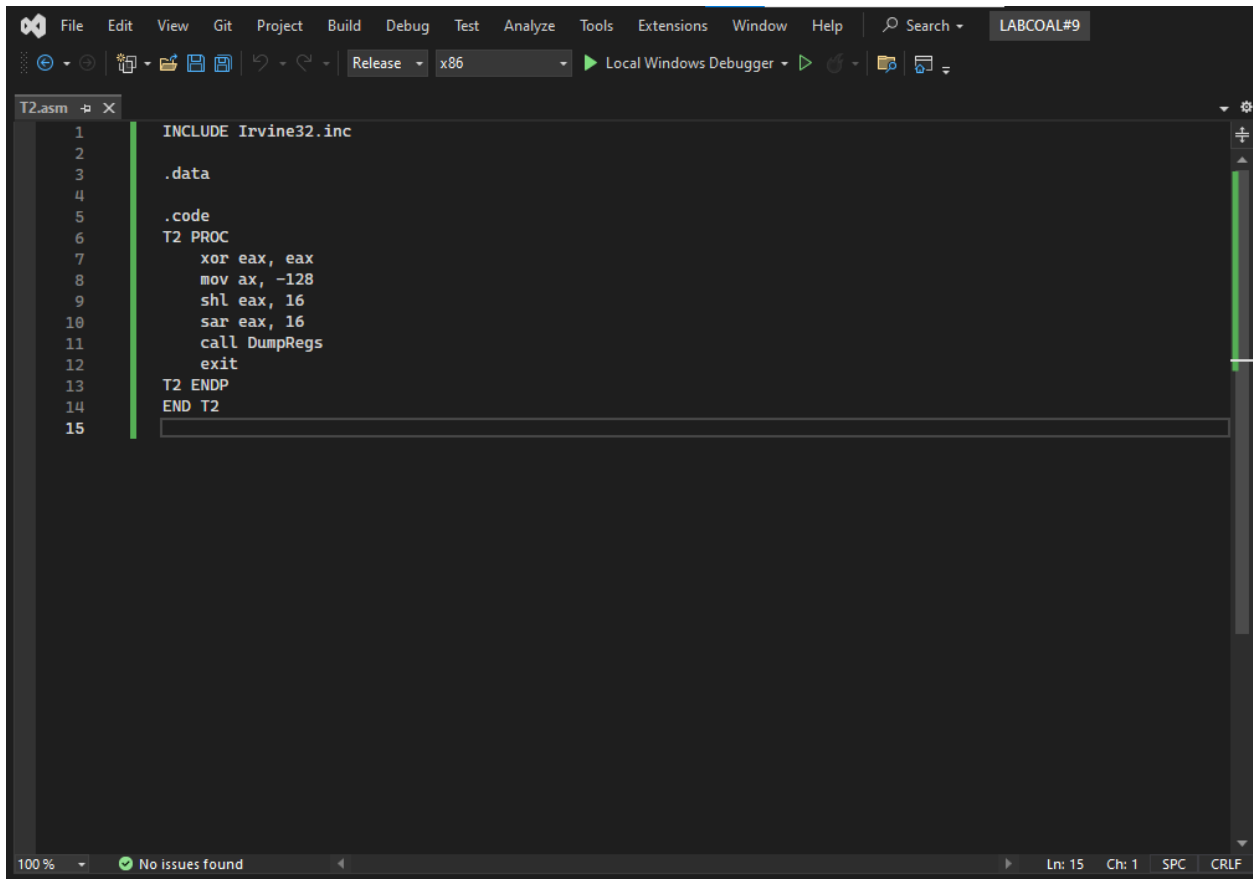
Output:

```
EAX=0000653A  EBX=000004D2  ECX=00001348  EDX=009C1FE0
ESI=009C1FE0  EDI=009C1FE0  EBP=00EFFD90  ESP=00EFFD84
EIP=009C1FF8  EFL=00000206  CF=0  SF=0  ZF=0  OF=0  AF=0  PF=1


C:\Users\Lenovo\OneDrive\Desktop\BAI-3\COAL LAB\LABCOAL#9\LABCOAL#9\Release\LABCOAL#9.exe (process 6564) exited with cod
e 0 (0x0).
Press any key to close this window . . .
```

Task 2:

```
INCLUDE Irvine32.inc

.data

.code
T2 PROC
    xor eax, eax
    mov ax, -128
    shl eax, 16
    sar eax, 16
    call DumpRegs
    exit
T2 ENDP
END T2
```

Output:
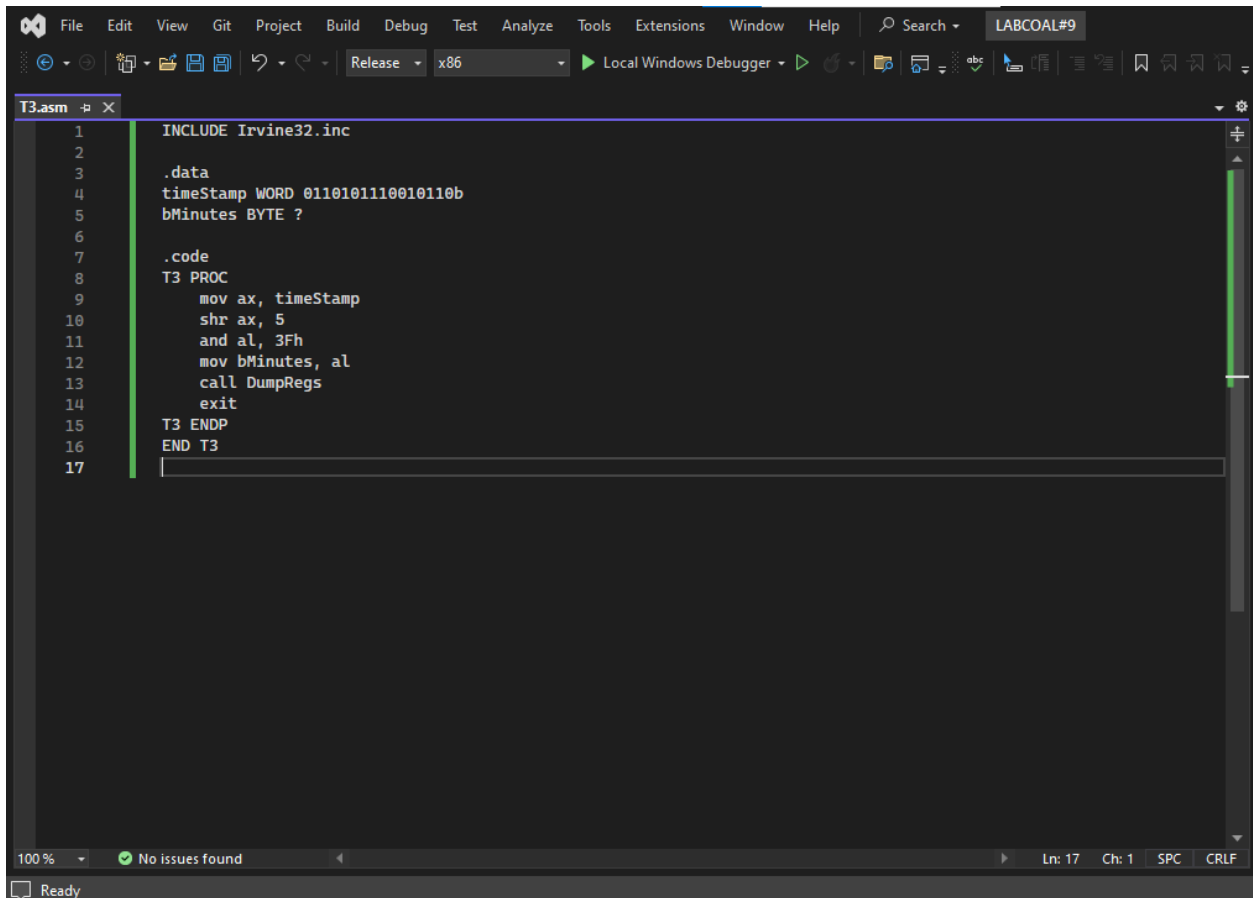
```
EAX=FFFFFF80  EBX=00D65000  ECX=006B1FE0  EDX=006B1FE0
ESI=006B1FE0  EDI=006B1FE0  EBP=00F3FF60  ESP=00F3FF54
EIP=006B1FF1  EFL=00000282  CF=0  SF=1  ZF=0  OF=0  AF=0  PF=0

C:\Users\Lenovo\OneDrive\Desktop\BAI-3\COAL LAB\LABCOAL#9\LABCOAL#9\Release\LABCOAL#9.exe (process 5888) exited with cod
e 0 (0x0).
Press any key to close this window . . .
```

Task 3:

```asm
INCLUDE Irvine32.inc

.data
timeStamp WORD 0110101110010110b
bMinutes BYTE ?

.code
T3 PROC
    mov ax, timeStamp
    shr ax, 5
    and al, 3Fh
    mov bMinutes, al
    call DumpRegs
    exit
T3 ENDP
END T3
```

Output:


```
 EAX=009F031C  EBX=00655000  ECX=008F1FE0  EDX=008F1FE0
 ESI=008F1FE0  EDI=008F1FE0  EBP=009FFA4C  ESP=009FFA40
 EIP=008F1FF6  EFL=00000202  CF=0  SF=0  ZF=0  OF=0  AF=0  PF=0


C:\Users\Lenovo\OneDrive\Desktop\BAI-3\COAL LAB\LABCOAL#9\LABCOAL#9\Release\LABCOAL#9.exe (process 3236) exited with cod
e 0 (0x0).
Press any key to close this window . . .
```

Task 4:

Release   x86   Local Windows Debugger

```asm
1        INCLUDE Irvine32.inc
2
3        .data
4        valAX WORD 0001h
5        valBX WORD 1234h
6        res1 WORD ?
7        res2 WORD ?
8
9        .code
10       T4 PROC
11           mov ax, valAX
12           mov bx, valBX
13           mov dx, ax
14
15           shr ax, 1
16           rcr bx, 1
17           mov res1, bx
18
19           mov ax, dx
20           mov bx, valBX
21           shrd bx, ax, 1
22           mov res2, bx
23
24           call DumpRegs
25           exit
26       T4 ENDP
27       END T4
28
```
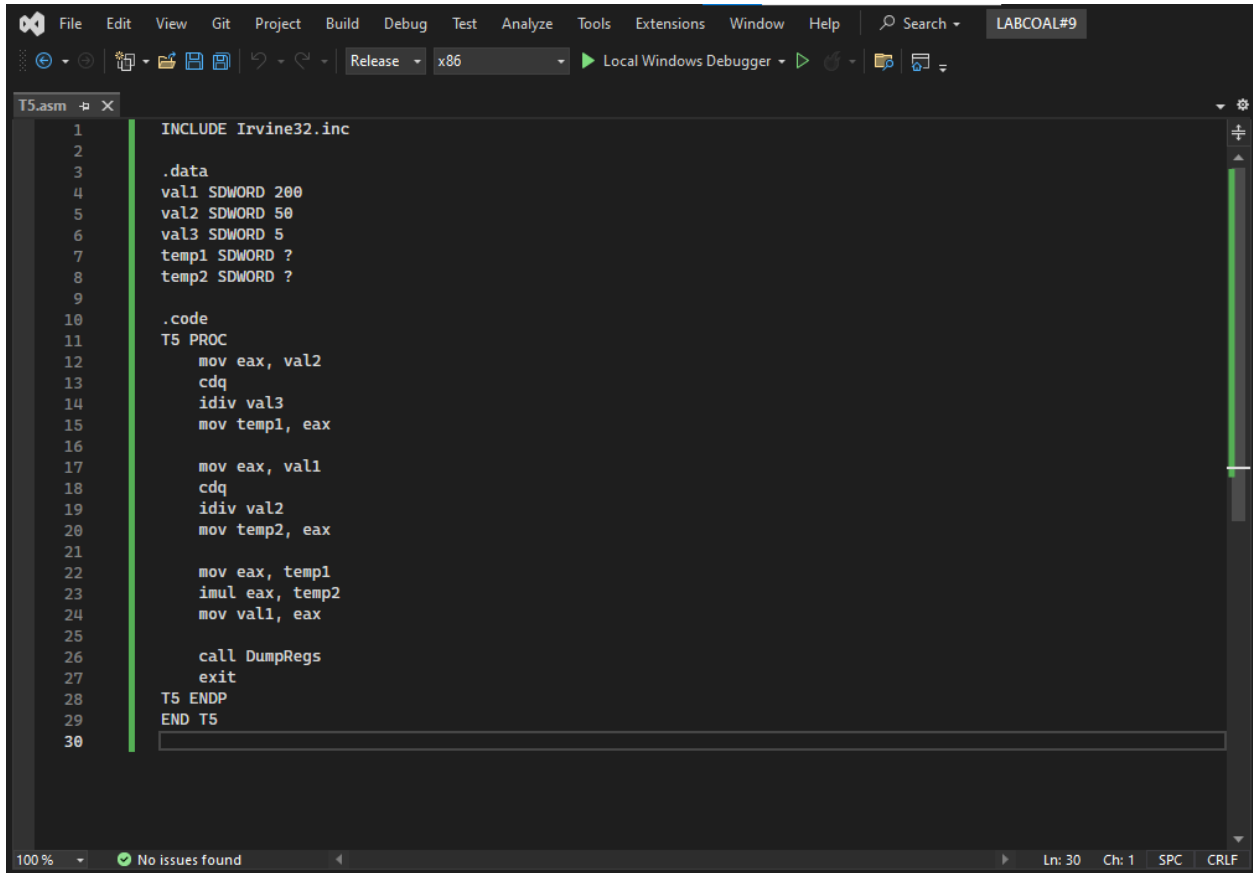
100 %   No issues found   Ln: 28   Ch: 1   SPC   CRLF

Output:

```
EAX=01130001  EBX=00E6891A  ECX=00C51FE0  EDX=00C50001
ESI=00C51FE0  EDI=00C51FE0  EBP=0113F88C  ESP=0113F880
EIP=00C52018  EFL=00000A82  CF=0  SF=1  ZF=0  OF=1  AF=0  PF=0


C:\Users\Lenovo\OneDrive\Desktop\BAI-3\COAL LAB\LABCOAL#9\LABCOAL#9\Release\LABCOAL#9.exe (process 3452) exited with cod
e 0 (0x0).
Press any key to close this window . . .
```
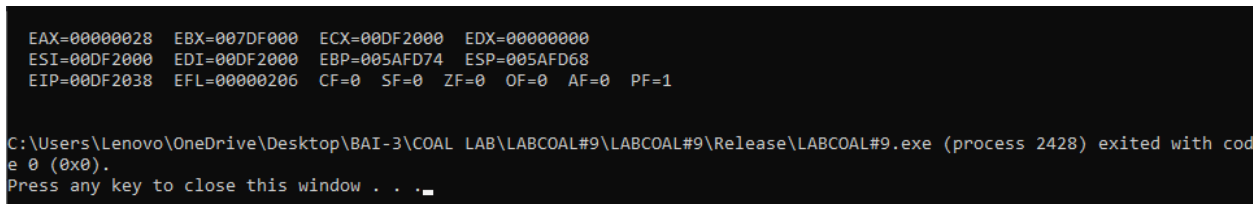
Task 5:

```asm
        INCLUDE Irvine32.inc

        .data
        val1 SDWORD 200
        val2 SDWORD 50
        val3 SDWORD 5
        temp1 SDWORD ?
        temp2 SDWORD ?

        .code
        T5 PROC
            mov eax, val2
            cdq
            idiv val3
            mov temp1, eax

            mov eax, val1
            cdq
            idiv val2
            mov temp2, eax

            mov eax, temp1
            imul eax, temp2
            mov val1, eax

            call DumpRegs
            exit
        T5 ENDP
        END T5
```

Output:

```
EAX=00000028  EBX=007DF000  ECX=00DF2000  EDX=00000000
ESI=00DF2000  EDI=00DF2000  EBP=005AFD74  ESP=005AFD68
EIP=00DF2038  EFL=00000206  CF=0  SF=0  ZF=0  OF=0  AF=0  PF=1


C:\Users\Lenovo\OneDrive\Desktop\BAI-3\COAL LAB\LABCOAL#9\LABCOAL#9\Release\LABCOAL#9.exe (process 2428) exited with cod
e 0 (0x0).
Press any key to close this window . . .
```
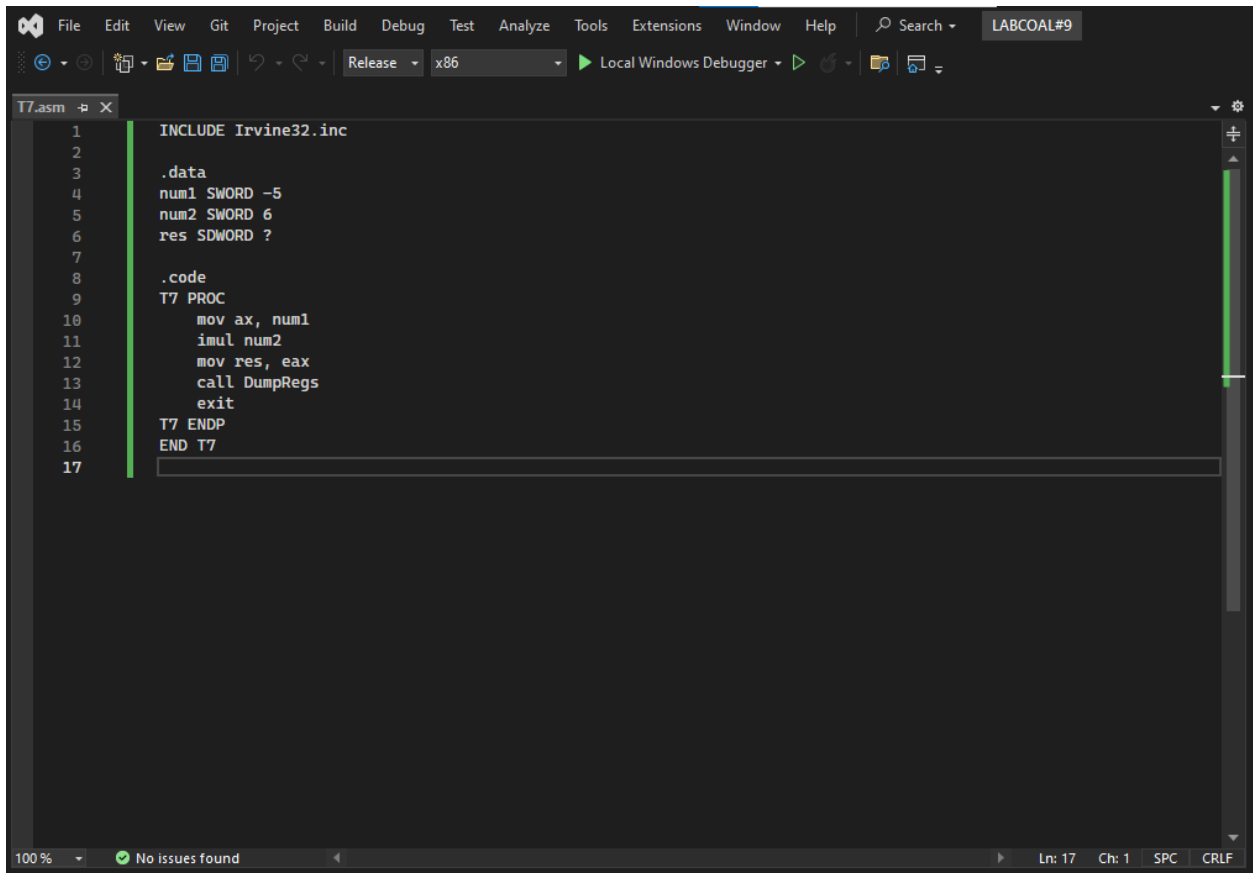
Task 6:

```asm
        INCLUDE Irvine32.inc

        .data
        a1 QWORD 0000000200000003h
        a2 QWORD 0000000300000004h
        result QWORD ?

        .code
        T6 PROC
            lea esi, a1
            lea edi, a2

            mov eax, DWORD PTR [esi]
            add eax, DWORD PTR [edi]
            mov DWORD PTR [result], eax

            mov eax, DWORD PTR [esi+4]
            adc eax, DWORD PTR [edi+4]
            mov DWORD PTR [result+4], eax

            call DumpRegs
            exit
        T6 ENDP
        END T6
```

Output:

```
EAX=00000005  EBX=0092D000  ECX=004B1FE0  EDX=004B1FE0
ESI=004B4000  EDI=004B4008  EBP=007BFD10  ESP=007BFD04
EIP=004B2005  EFL=00000206  CF=0  SF=0  ZF=0  OF=0  AF=0  PF=1


C:\Users\Lenovo\OneDrive\Desktop\BAI-3\COAL LAB\LABCOAL#9\LABCOAL#9\Release\LABCOAL#9.exe (process 11720) exited with co
de 0 (0x0).
Press any key to close this window . . .
```

Task 7:

```
         INCLUDE Irvine32.inc

    .data
    num1 SWORD -5
    num2 SWORD 6
    res SDWORD ?

    .code
    T7 PROC
        mov ax, num1
        imul num2
        mov res, eax
        call DumpRegs
        exit
    T7 ENDP
    END T7
```

Output:

```
 EAX=0073FFE2   EBX=00494000   ECX=00AB1FE0   EDX=00ABFFFF
 ESI=00AB1FE0   EDI=00AB1FE0   EBP=0073FA78   ESP=0073FA6C
 EIP=00AB1FF7   EFL=00000286   CF=0  SF=1  ZF=0  OF=0  AF=0  PF=1


C:\Users\Lenovo\OneDrive\Desktop\BAI-3\COAL LAB\LABCOAL#9\LABCOAL#9\Release\LABCOAL#9.exe (process 1892) exited with cod
e 0 (0x0).
Press any key to close this window . . .
```

Task 8:

```asm
INCLUDE Irvine32.inc

.data
num1 SDWORD -125
num2 SDWORD 5
quot SDWORD ?
rem SDWORD ?

.code
T8 PROC
    mov eax, num1
    cdq
    idiv num2
    mov quot, eax
    mov rem, edx
    call DumpRegs
    exit
T8 ENDP
END T8
```

Output:


```
EAX=FFFFFFE7  EBX=00DE4000  ECX=00931FE0  EDX=00000000
ESI=00931FE0  EDI=00931FE0  EBP=00EFF958  ESP=00EFF94C
EIP=00931FFC  EFL=00000246  CF=0  SF=0  ZF=1  OF=0  AF=0  PF=1


C:\Users\Lenovo\OneDrive\Desktop\BAI-3\COAL LAB\LABCOAL#9\LABCOAL#9\Release\LABCOAL#9.exe (process 11844) exited with co
de 0 (0x0).
Press any key to close this window . . .
```

Task 9:

```asm
INCLUDE Irvine32.inc

.data
val1 DWORD 0FFFFFFFFh
val2 DWORD 1
sumLow DWORD ?
sumHigh DWORD ?

.code
T9 PROC
    mov eax, val1
    add eax, val2
    mov sumLow, eax
    mov eax, 0
    adc eax, 0
    mov sumHigh, eax
    call DumpRegs
    exit
T9 ENDP
END T9
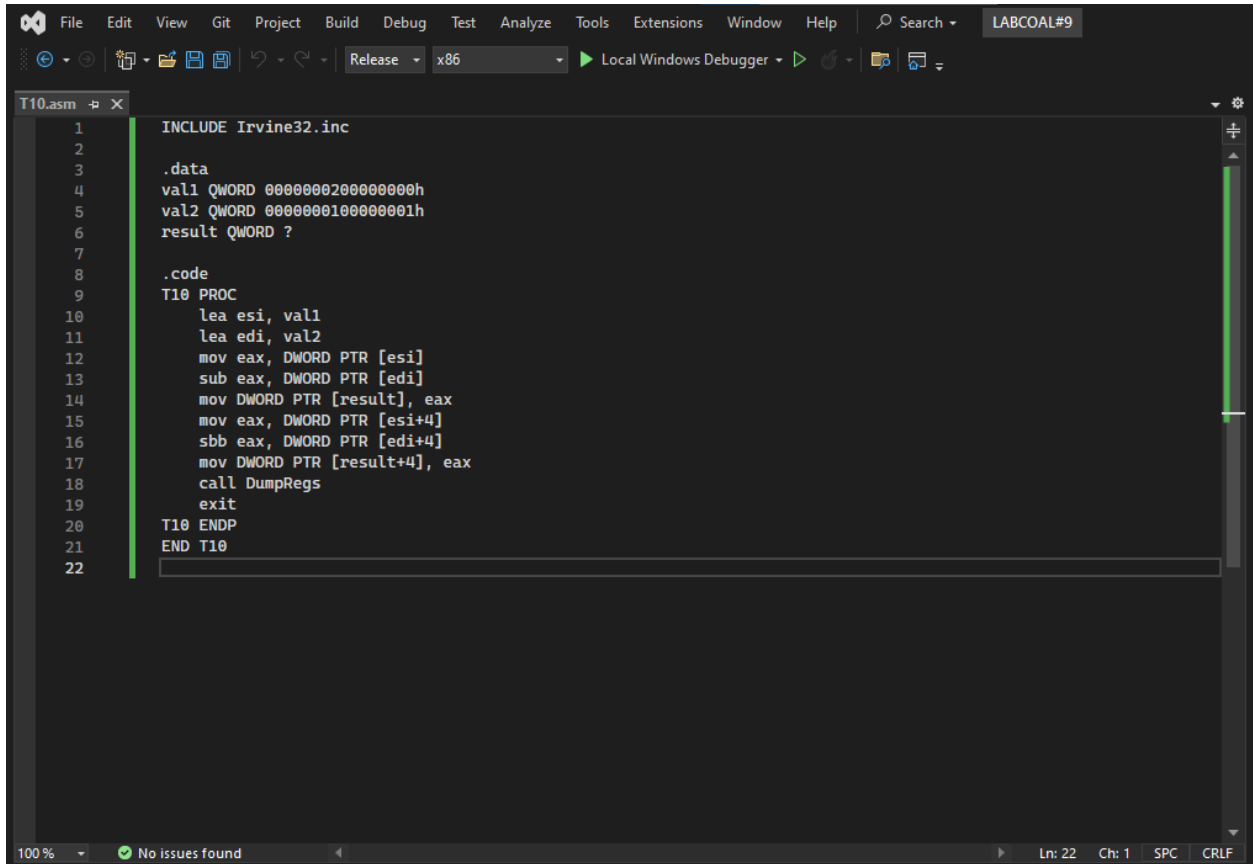```

*Output:*



```
EAX=00000001 EBX=00FAC000 ECX=00AA1FE0 EDX=00AA1FE0
ESI=00AA1FE0 EDI=00AA1FE0 EBP=010FFC68 ESP=010FFC5C
EIP=00AA2002 EFL=00000202 CF=0 SF=0 ZF=0 OF=0 AF=0 PF=0

C:\Users\Lenovo\OneDrive\Desktop\BAI-3\COAL LAB\LABCOAL#9\LABCOAL#9\Release\LABCOAL#9.exe (process 864) exited with code
0 (0x0).
Press any key to close this window . . .
```
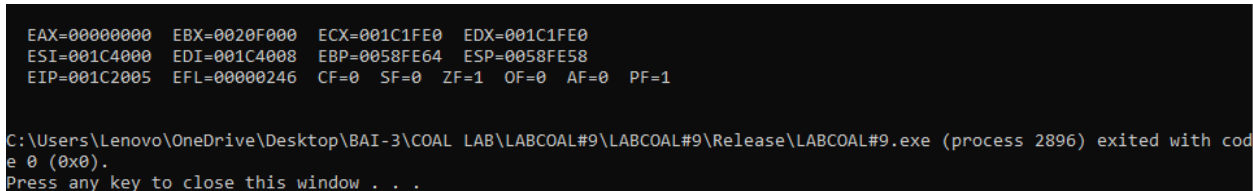
*Task 10:*

```asm
INCLUDE Irvine32.inc

.data
val1 QWORD 0000000200000000h
val2 QWORD 0000000100000001h
result QWORD ?

.code
T10 PROC
    lea esi, val1
    lea edi, val2
    mov eax, DWORD PTR [esi]
    sub eax, DWORD PTR [edi]
    mov DWORD PTR [result], eax
    mov eax, DWORD PTR [esi+4]
    sbb eax, DWORD PTR [edi+4]
    mov DWORD PTR [result+4], eax
    call DumpRegs
    exit
T10 ENDP
END T10
```

Output:

```
EAX=00000000  EBX=0020F000  ECX=001C1FE0  EDX=001C1FE0
ESI=001C4000  EDI=001C4008  EBP=0058FE64  ESP=0058FE58
EIP=001C2005  EFL=00000246  CF=0  SF=0  ZF=1  OF=0  AF=0  PF=1


C:\Users\Lenovo\OneDrive\Desktop\BAI-3\COAL LAB\LABCOAL#9\LABCOAL#9\Release\LABCOAL#9.exe (process 2896) exited with cod
e 0 (0x0).
Press any key to close this window . . .
```

Task 11:

```asm
INCLUDE Irvine32.inc

.data
num1 QWORD 00000001FFFFFFFFh
num2 QWORD 0000000100000001h
sum QWORD ?

.code
T11 PROC
    lea esi, num1
    lea edi, num2
    mov eax, DWORD PTR [esi]
    add eax, DWORD PTR [edi]
    mov DWORD PTR [sum], eax
    mov eax, DWORD PTR [esi+4]
    adc eax, DWORD PTR [edi+4]
    mov DWORD PTR [sum+4], eax
    call DumpRegs
    exit
T11 ENDP
END T11
```

Output:

```
EAX=00000003  EBX=004C5000  ECX=00D81FE0  EDX=00D81FE0
ESI=00D84000  EDI=00D84008  EBP=003AF9E0  ESP=003AF9D4
EIP=00D82005  EFL=00000206  CF=0  SF=0  ZF=0  OF=0  AF=0  PF=1


C:\Users\Lenovo\OneDrive\Desktop\BAI-3\COAL LAB\LABCOAL#9\LABCOAL#9\Release\LABCOAL#9.exe (process 3220) exited with cod
e 0 (0x0).
Press any key to close this window . . .
```