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**Roll No** : 19k-0259

## Assignment: 01

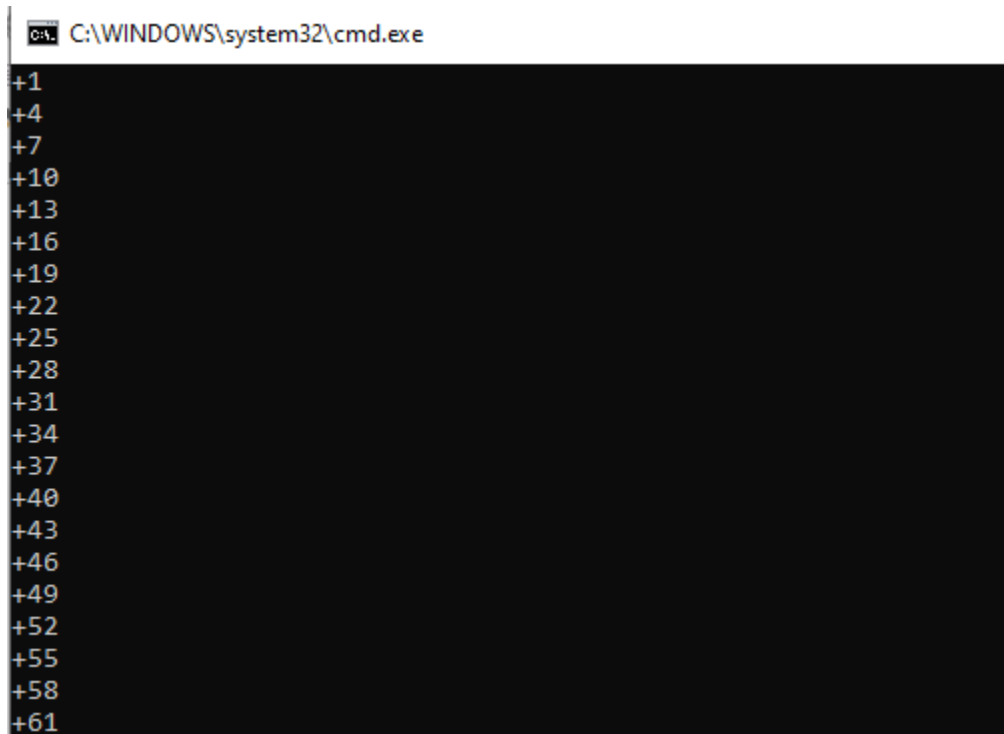
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### Task 1: (a)

#### Code:

```
INCLUDE Irvine32.inc
.code
main PROC
mov eax, 1
mov ecx, 50
l1:
    call WriteInt
    call crlf
    add eax, 3
Loop l1
exit
main ENDP
END main
```

#### Screenshot:



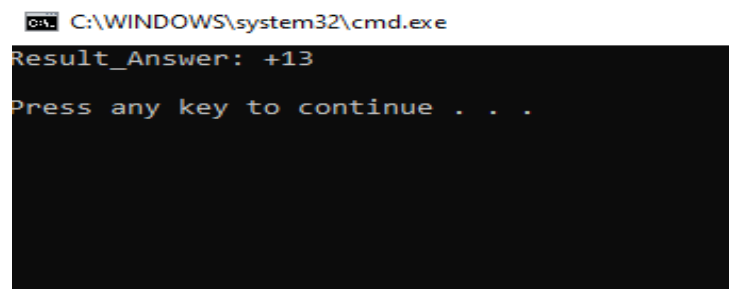
```
C:\WINDOWS\system32\cmd.exe
+1
+4
+7
+10
+13
+16
+19
+22
+25
+28
+31
+34
+37
+40
+43
+46
+49
+52
+55
+58
+61
```

**(b)**

**Code:**

```
INCLUDE Irvine32.inc
.data
msg BYTE "Result_Answer: ",0
result_answer DWORD ?
x DWORD 2
y DWORD 59
.code
main PROC
mov eax, 0
mov ebx, 0
mov esi, 0
mov eax, y[esi*TYPE y]
add eax, 5
mov ebx, x[esi*TYPE x]
add ebx, 2
sub eax, ebx
add eax, 10
mov result_answer, eax
mov eax, 0
mov ebx, 0
mov eax, x[esi*TYPE x]
add eax, y[esi*TYPE y]
mov ebx, y[esi*TYPE y]
add ebx, 2
sub eax, ebx
mov edx, 0
mov edx, x[esi*TYPE x]
sub edx, y[esi*TYPE y]
sub edx, eax
add result_answer, edx
mov edx, OFFSET msg
call WriteString
mov eax, result_answer
call WriteInt
call crlf
call crlf
exit
main ENDP
END main
```

**Screenshot:**



## Task 2: (a)

### Code:

```
INCLUDE Irvine32.inc
.data
msg BYTE "Results of Addition of Colomns in EAX Register: ",0
Array1 BYTE 11, 22, 33
Array2 BYTE 111, 222, 233
Array3 WORD 1111, 2222, 3333
Res1 DWORD ?, ?, ?
.code
main PROC
mov eax, 0
mov ebx, 0
mov edx, 0
call AddArrays_0
mov eax, 0
mov ebx, 0
mov edx, 0
call AddArrays_1
mov eax, 0
mov ebx, 0
mov edx, 0
call AddArrays_2
exit
main ENDP
AddArrays_0 PROC
mov esi, 0
movzx eax, Array1[esi]
movzx ebx, Array2[esi]
movzx edx, Array3[esi]
inc eax
inc ebx
inc edx
add eax, ebx
add eax, edx
mov edx, OFFSET msg
call WriteString
call DumpRegs
mov Res1[esi], eax
RET
AddArrays_0 ENDP
AddArrays_1 PROC
mov esi, 1
movzx eax, Array1[esi]
movzx ebx, Array2[esi]
movzx edx, Array3[esi]
inc eax
inc ebx
inc edx
add eax, ebx
add eax, edx
mov edx, OFFSET msg
call WriteString
Call DumpRegs
mov Res1[esi], eax
```

```

RET
AddArrays_1 ENDP
AddArrays_2 PROC
mov esi, 2
movzx eax, Array1[esi]
movzx ebx, Array2[esi]
movzx edx, Array3[esi]
inc eax
inc ebx
inc edx
add eax, ebx
add eax, edx
mov edx, OFFSET msg
call WriteString
call DumpRegs
mov Res1[esi], eax
RET
AddArrays_2 ENDP
END main

```

## Screenshot:

The screenshot shows a Windows command prompt window with the title bar "C:\WINDOWS\system32\cmd.exe". The window displays the output of a program, showing the results of addition of columns in the EAX register at three different points. The output is as follows:

```

Results of Addition of Colomns in EAX Register:
EAX=000004D4 EBX=00000070 ECX=007C1014 EDX=007C5000
ESI=00000000 EDI=007C1014 EBP=0077F9AC ESP=0077F99C
EIP=007C10A3 EFL=00000202 CF=0 SF=0 ZF=0 OF=0 AF=0 PF=0

Results of Addition of Colomns in EAX Register:
EAX=0000AEFB EBX=000000DF ECX=007C1014 EDX=007C5000
ESI=00000001 EDI=007C1014 EBP=0077F9AC ESP=0077F99C
EIP=007C10DA EFL=00000202 CF=0 SF=0 ZF=0 OF=0 AF=0 PF=0

Results of Addition of Colomns in EAX Register:
EAX=000009BB EBX=000000EA ECX=007C1014 EDX=007C5000
ESI=00000002 EDI=007C1014 EBP=0077F9AC ESP=0077F99C
EIP=007C1111 EFL=00000202 CF=0 SF=0 ZF=0 OF=0 AF=0 PF=0

Press any key to continue . . .

```

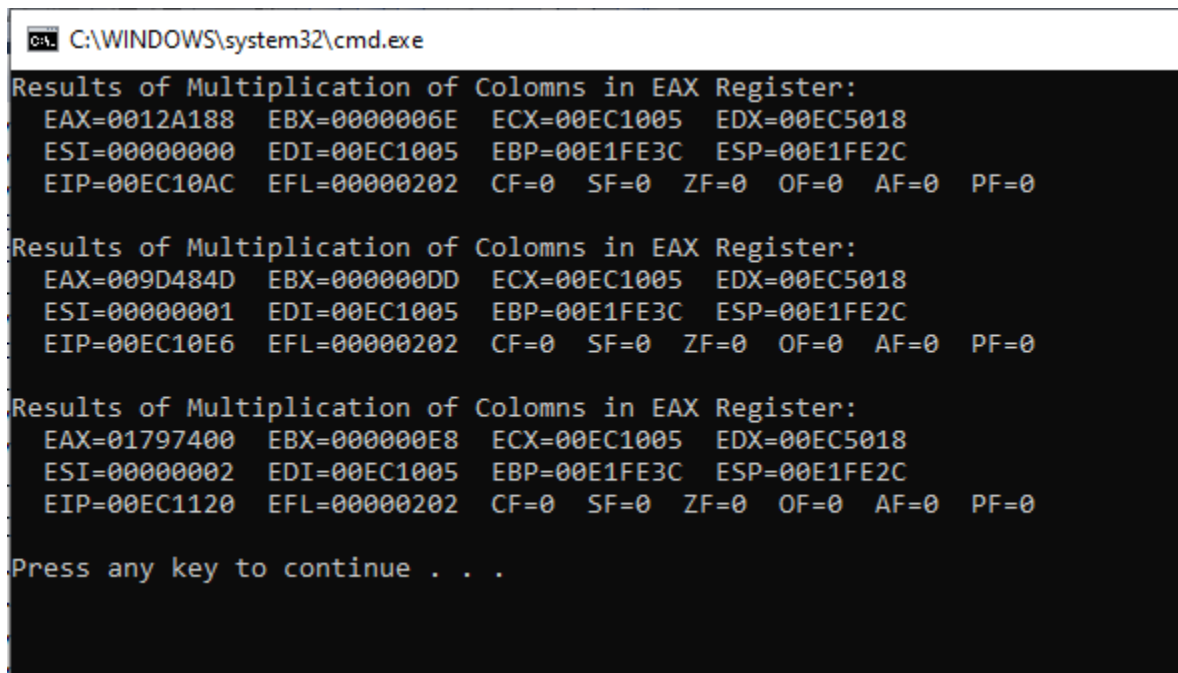
## Task 2 (b)

### Code:

```
INCLUDE Irvine32.inc
.data
Array1 BYTE 11, 22, 33
Array2 BYTE 111, 222, 233
Array3 WORD 1111, 2222, 3333
Res1 DWORD ?, ?, ?
msg BYTE "Results of Multiplication of Columns in EAX Register: ",0
.code
main PROC
    mov eax, 0
    mov ebx, 0
    mov edx, 0
    call MArrays_0
    mov eax, 0
    mov ebx, 0
    mov edx, 0
    call MArrays_1
    mov eax, 0
    mov ebx, 0
    mov edx, 0
    call MArrays_2
    exit
main ENDP
MArrays_0 PROC
    mov esi, 0
    movzx eax, Array1[esi*TYPE Array1]
    movzx ebx, Array2[esi*TYPE Array2]
    DEC eax
    DEC ebx
    mul ebx
    movzx edx, Array3[esi*TYPE Array3]
    DEC edx
    mul edx
    mov Res1[esi], eax
    mov edx, OFFSET msg
    call WriteString
    Call DumpRegs
    RET
MArrays_0 ENDP
MArrays_1 PROC
    mov esi, 1
    movzx eax, Array1[esi*TYPE Array1]
    movzx ebx, Array2[esi*TYPE Array2]
    DEC eax
    DEC ebx
    MUL ebx
    movzx edx, Array3[esi*TYPE Array3]
    DEC edx
    MUL edx
    mov Res1[esi], eax
    mov edx, OFFSET msg
    call WriteString
    Call DumpRegs
```

```
RET
MArrays_1 ENDP
MArrays_2 PROC
mov esi, 2
movzx eax, Array1[esi*TYPE Array1]
movzx ebx, Array2[esi*TYPE Array2]
DEC eax
DEC ebx
MUL ebx
movzx edx, Array3[esi*TYPE Array3]
DEC edx
MUL edx
mov Res1[esi], eax
mov edx, OFFSET msg
call WriteString
Call DumpRegs
RET
MArrays_2 ENDP
END main
```

## Screenshot:



The screenshot shows a Windows command prompt window titled "C:\WINDOWS\system32\cmd.exe". The window displays the output of a program that prints the results of multiplication of columns in the EAX register. The output is as follows:

```
Results of Multiplication of Colomns in EAX Register:
EAX=0012A188 EBX=0000006E ECX=00EC1005 EDX=00EC5018
ESI=00000000 EDI=00EC1005 EBP=00E1FE3C ESP=00E1FE2C
EIP=00EC10AC EFL=00000202 CF=0 SF=0 ZF=0 OF=0 AF=0 PF=0

Results of Multiplication of Colomns in EAX Register:
EAX=009D484D EBX=000000DD ECX=00EC1005 EDX=00EC5018
ESI=00000001 EDI=00EC1005 EBP=00E1FE3C ESP=00E1FE2C
EIP=00EC10E6 EFL=00000202 CF=0 SF=0 ZF=0 OF=0 AF=0 PF=0

Results of Multiplication of Colomns in EAX Register:
EAX=01797400 EBX=000000E8 ECX=00EC1005 EDX=00EC5018
ESI=00000002 EDI=00EC1005 EBP=00E1FE3C ESP=00E1FE2C
EIP=00EC1120 EFL=00000202 CF=0 SF=0 ZF=0 OF=0 AF=0 PF=0

Press any key to continue . . .
```

### Task 3:

A)

```
Registers
EAX = 00C94000
```

```
Registers
EAX = 00000400
```

B)

```
Registers
EAX = 00C94004
```

```
Registers
EAX = 00000600
```

C)

```
Registers
EAX = 00C94007
```

```
Registers
EAX = 00001000
```

D)

```
Registers
EAX = 00C9400C
```

```
Registers
EAX = 00000702
```

E)

```
Registers
EAX = 00C94010
```

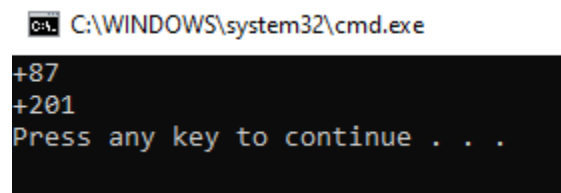
```
Registers
EAX = 00000000
```

---

## Task 4:

```
INCLUDE Irvine32.inc
.data
arrayW DW 50,20,90,101,450
arrayB DB 10, 24,67,90,100
Ibadullah BYTE ?,?
.code
main PROC
mov edi, 0
mov esi, 1
mov ecx, 2
l1:
    mov al, BYTE PTR arrayW[esi*TYPE arrayW]
    INC esi
    add al, arrayB[esi*TYPE arrayB]
    INC esi
    mov Ibadullah[edi], al
    INC edi
    mov eax, 0
Loop l1
mov al, Ibadullah+0
call WriteInt
call crlf
mov al, Ibadullah+1
call WriteInt
call crlf
exit
main ENDP
END main
```

## Screenshot:



**Note:** Loop will run two time, 1<sup>st</sup> time it will add arrayW[1]+arrayB[2] next time it will add arrayW[3]+array[4], in this loop array[4] is the last element to array so that I have moved 2 in ecx.

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### Task 5:

(a):

**AX: 5816**

**AL: 16**

**AH: 58**

**CX: 1058**

**CL: 58**

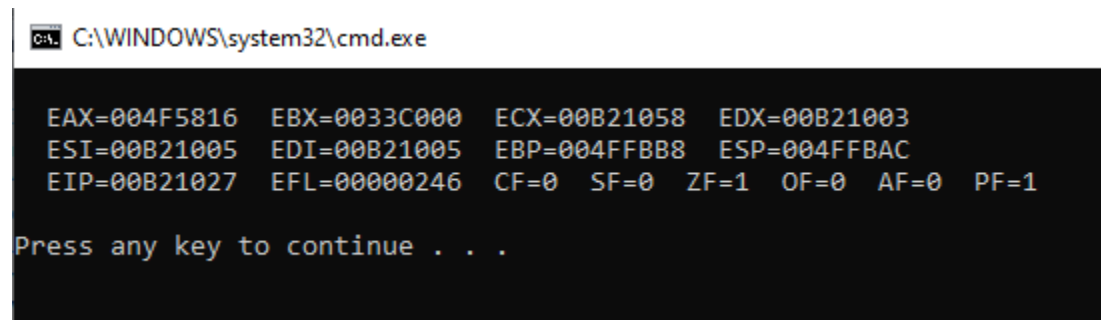
**CH: 10**

**DX: 1003**

**DL: 03**

**DH: 10**

**Screenshot:**



A screenshot of a Windows command prompt window. The title bar shows the path 'C:\WINDOWS\system32\cmd.exe'. The command prompt displays the following register values: EAX=004F5816, EBX=0033C000, ECX=00B21058, EDX=00B21003, ESI=00B21005, EDI=00B21005, EBP=004FFBB8, ESP=004FFBAC, EIP=00B21027, EFL=00000246, CF=0, SF=0, ZF=1, OF=0, AF=0, PF=1. Below the register values, it says 'Press any key to continue . . .'

```
C:\WINDOWS\system32\cmd.exe

EAX=004F5816  EBX=0033C000  ECX=00B21058  EDX=00B21003
ESI=00B21005  EDI=00B21005  EBP=004FFBB8  ESP=004FFBAC
EIP=00B21027  EFL=00000246  CF=0  SF=0  ZF=1  OF=0  AF=0  PF=1

Press any key to continue . . .
```

(b)

**AX: 8B91**

**AL: 91**

**AH: 8B**

**CX: A035**

**CL: 35**

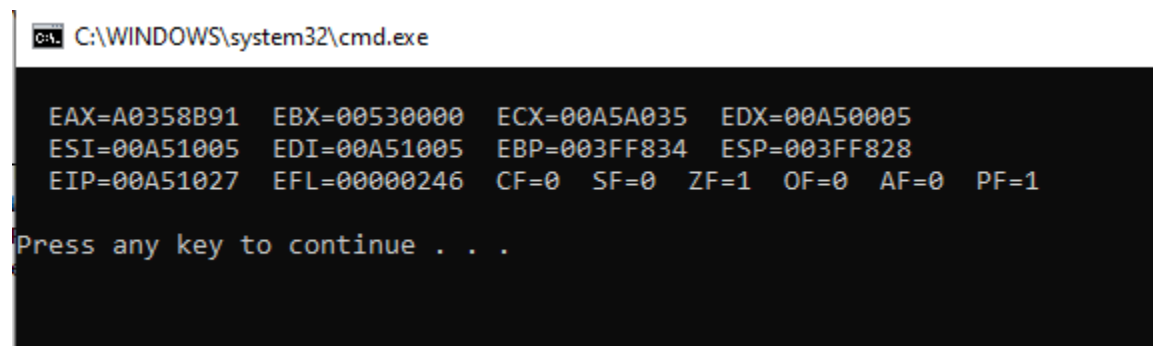
**CH: A0**

**DX: 0005**

**DL: 05**

**DH: 00**

**Screenshot:**



A screenshot of a Windows command prompt window. The title bar shows the path 'C:\WINDOWS\system32\cmd.exe'. The command prompt displays the following register values: EAX=A0358B91, EBX=00530000, ECX=00A5A035, EDX=00A50005, ESI=00A51005, EDI=00A51005, EBP=003FF834, ESP=003FF828, EIP=00A51027, EFL=00000246, CF=0, SF=0, ZF=1, OF=0, AF=0, PF=1. Below the register values, it says 'Press any key to continue . . .'

```
C:\WINDOWS\system32\cmd.exe

EAX=A0358B91  EBX=00530000  ECX=00A5A035  EDX=00A50005
ESI=00A51005  EDI=00A51005  EBP=003FF834  ESP=003FF828
EIP=00A51027  EFL=00000246  CF=0  SF=0  ZF=1  OF=0  AF=0  PF=1

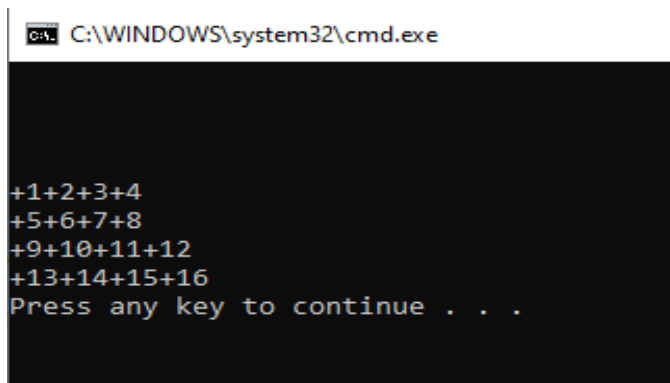
Press any key to continue . . .
```

## **Task 6:**

### **Code:**

```
INCLUDE Irvine32.inc
.data
one DWORD ?,?,?,?
        DWORD ?,?,?,?
        DWORD ?,?,?,?
        DWORD ?,?,?,?
.code
main PROC
mov eax, 1
mov esi, 0
mov ecx, 4
l1:
        PUSH ecx
        mov ecx, 4
        l2:
                mov one[esi*TYPE one], eax
                INC esi
                INC eax
        Loop l2
        call crlf
        POP ecx
Loop l1
mov esi, 0
mov ecx, LENGTHOF one
l3:
        PUSH ecx
        mov ecx, LENGTHOF one
        l4:
                mov eax, one[esi*TYPE one]
                INC esi
                call WriteInt
        Loop l4
        call crlf
        POP ecx
Loop l3
exit
main ENDP
END main
```

### **Screenshot:**



```
C:\WINDOWS\system32\cmd.exe

+1+2+3+4
+5+6+7+8
+9+10+11+12
+13+14+15+16
Press any key to continue . . .
```