LAB 5

Questions:

Use following array declarations:

arrayB BYTE 10, 20, 30 arrayW

WORD 150, 250, 350 arrayD

DWORD 600, 1200, 1800

Now initialize three double word variables SUM1, SUM2, SUM3 and perform following operations

(expressed in pseudo-code here):

SUM1 = arrayB[0] + arrayW[0] + arrayD[0]

SUM2 = arrayB[1] + arrayW[1] + arrayD[1]

SUM3 = arrayB[2] + arrayW[2] + arrayD[2]

5. Initialize two arrays: array1

BYTE 10, 20, 30, 40

array2 BYTE 4 DUP (?)

Copy elements of array1 into array2 in reverse order using either indirect addressing or direct-offset

addressing.Use ESI and EDI Registers. (Hint: INC and DEC of OFFSET).

6. Subtract an array of 5 doublewords using indirect operands. Save the final result in a variable.

7. Use following array declarations:

arrayB BYTE 60, 70, 80

arrayW WORD 150, 250, 350

arrayD DWORD 600, 1200, 1800

For each array, add its 1st and last element using scale factors and display the result in a

separate register. (Hint: Use ESI and TYPE Operator).

Q3

Code:

```
INCLUDE Irvine32.inc

.data
arr BYTE 61,43,11,52,25
sortedarr BYTE 5 DUP(?)

.code
main PROC
MOV EAX , 0
MOV Al , 11
MOV sortedarr[0] , AL
call Writeint
MOV AL , 25
MOV sortedarr[1] , AL
call Writeint
MOV AL , 43
MOV sortedarr[2] , AL
call Writeint
MOV AL , 52
MOV sortedarr[3] , AL
call Writeint
MOV AL , 61
MOV sortedarr[4] , AL
call Writeint

call DumpRegs

exit
main ENDP
END main
```

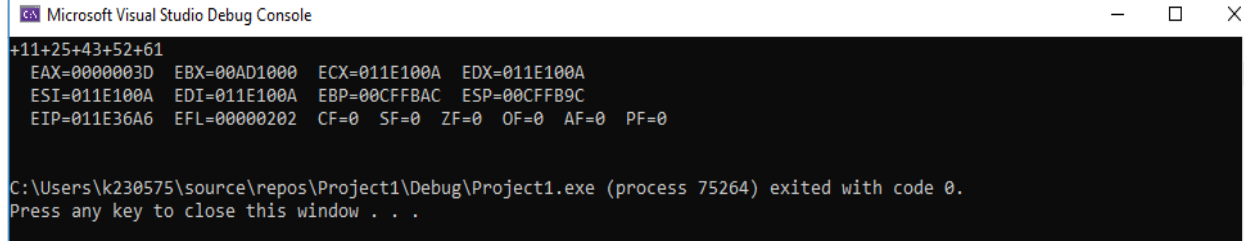For WORD and DWORD , the offset value is needed to be adjusted and register bit value

If array is of WORD type

```
.code

MOV EAX , 0
MOV AX , 11 ; AX is of 16 bits
MOV sortedarr[0] , AX
Call Writeint
MOV AX , 25
MOV sortedarr[2] , AX
Call Writeint
MOV AX , 43
MOV sortedarr[4] , AX
Call Writeint
MOV AX , 52
MOV sortedarr[6] , AX
Call Writeint
MOV AX , 61
MOV sortedarr[8] , AX
Call Writeint
```

If array is of DWORD type

```
MOV EAX , 0
MOV EAX , 11  ; EAX is of 32 bits
MOV sortedarr[0] , EAX
Call writeint
MOV EAX , 25
MOV sortedarr[4] , EAX
Call writeint
MOV EAX , 43
MOV sortedarr[8] , EAX
Call writeint
MOV EAX , 52
MOV sortedarr[12] , EAX
Call Writeint
MOV EAX , 61
MOV sortedarr[16] , EAX
Call Writeint
```

```
Microsoft Visual Studio Debug Console                                    —    □    ×

+11+25+43+52+61
  EAX=0000003D  EBX=00AD1000  ECX=011E100A  EDX=011E100A
  ESI=011E100A  EDI=011E100A  EBP=00CFFBAC  ESP=00CFFB9C
  EIP=011E36A6  EFL=00000202  CF=0  SF=0  ZF=0  OF=0  AF=0  PF=0


C:\Users\k230575\source\repos\Project1\Debug\Project1.exe (process 75264) exited with code 0.
Press any key to close this window . . .
```

Q4

Code:

```
INCLUDE Irvine32.inc


.data
arrayB BYTE 10, 20, 30
arrayW WORD 150, 250, 350
arrayD DWORD 600, 1200, 1800

SUM1 DWORD ?
SUM2 DWORD ?
SUM3 DWORD ?

.code
main PROC
;SUM1 = arrayB[0] + arrayW[0] + arrayD[0]

MOV EAX , 0
MOVZX EAX , [arrayB]
MOVZX EBX , [arrayW]
ADD EAX , EBX
MOV ECX , [arrayD]
ADD EAX , ECX
call Writeint
call DumpRegs
```

```
MOV SUM1 , EAX   ; SUM1 = EAX

call crlf

;SUM2 = arrayB[1] + arrayW[1] + arrayD[1]
MOV EAX , 0
MOV EBX , 0
MOV ECX , 0
MOVZX EAX , [arrayB+1]
MOVZX EBX , [arrayW+2]
ADD EAX , EBX
MOV ECX , [arrayD+4]
ADD EAX , ECX
call Writeint
call DumpRegs
MOV SUM2 , EAX   ; SUM1 = EAX

call crlf

;SUM3 = arrayB[2] + arrayW[2] + arrayD[2]
MOV EAX , 0
MOV EBX , 0
MOV ECX , 0
MOVZX EAX , [arrayB+2]
MOVZX EBX , [arrayW+4]
ADD EAX , EBX
MOV ECX , [arrayD+8]
ADD EAX , ECX
call Writeint
call DumpRegs
MOV SUM3 , EAX   ; SUM1 = EAX

exit
main ENDP
END main
```

```
+760
  EAX=000002F8  EBX=00000096  ECX=00000258  EDX=003710AA
  ESI=003710AA  EDI=003710AA  EBP=00AFFC64  ESP=00AFFC58
  EIP=00373687  EFL=00000202  CF=0  SF=0  ZF=0  OF=0  AF=0  PF=0


+1470
  EAX=000005BE  EBX=000000FA  ECX=000004B0  EDX=003710AA
  ESI=003710AA  EDI=003710AA  EBP=00AFFC64  ESP=00AFFC58
  EIP=003736C2  EFL=00000202  CF=0  SF=0  ZF=0  OF=0  AF=0  PF=0


+2180
  EAX=00000884  EBX=0000015E  ECX=00000708  EDX=003710AA
  ESI=003710AA  EDI=003710AA  EBP=00AFFC64  ESP=00AFFC58
  EIP=003736FD  EFL=00000202  CF=0  SF=0  ZF=0  OF=0  AF=0  PF=0
```

Q5

Code:

```
INCLUDE Irvine32.inc

.data
array1 BYTE 10, 20, 30, 40
array2 BYTE 4 DUP (?)

.code
main PROC
MOV ESI , 3
MOV EDI , 0
MOV EAX , 0

MOV AL , array2[EDI]
XCHG AL , array1[ESI]
MOVZX EAX , AL
Call Writeint
DEC ESI
INC EDI

MOV EAX , 0
MOV AL , array2[EDI]
XCHG AL , array1[ESI]
MOVZX EAX , AL
Call Writeint
DEC ESI
INC EDI

MOV EAX , 0
MOV AL , array2[EDI]
XCHG AL , array1[ESI]
MOVZX EAX , AL
Call Writeint
DEC ESI
INC EDI

MOV EAX , 0
MOV AL , array2[EDI]
XCHG AL , array1[ESI]
MOVZX EAX , AL
Call Writeint
DEC ESI
INC EDI

;call Writeint
;call DumpRegs

exit
main ENDP
END main
```
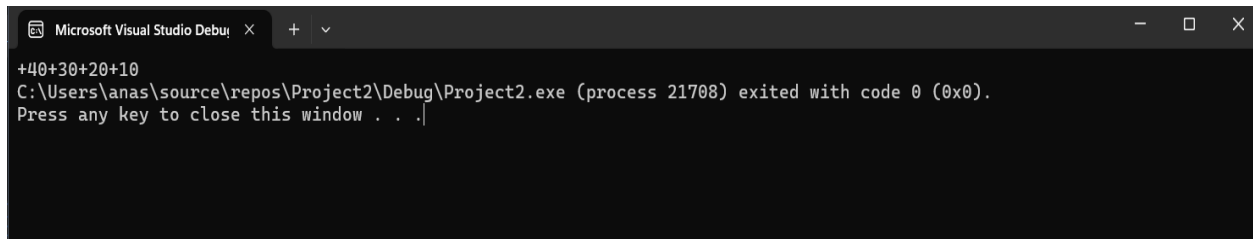


```
+40+30+20+10
C:\Users\anas\source\repos\Project2\Debug\Project2.exe (process 21708) exited with code 0 (0x0).
Press any key to close this window . . .
```

Q6

Code:

```
INCLUDE Irvine32.inc

.data
array1 DWORD 1000, 200, 150, 50, 20
result DWORD ? ; variable 'result' uninitialized

.code
main PROC

MOV ESI , 0
MOV EAX , 0
MOV ESI , OFFSET array1 ; Point esi to first element
MOV EAX , [ESI] ; store the first element is eax

ADD ESI , 4 ; Move to the next element
SUB EAX , [ESI]

ADD ESI , 4
SUB EAX , [ESI]

ADD ESI , 4
SUB EAX , [ESI]

ADD ESI , 4
SUB EAX , [ESI]

MOV result , EAX ; result = EAX

call Writeint
call DumpRegs

exit
main ENDP
END main
```
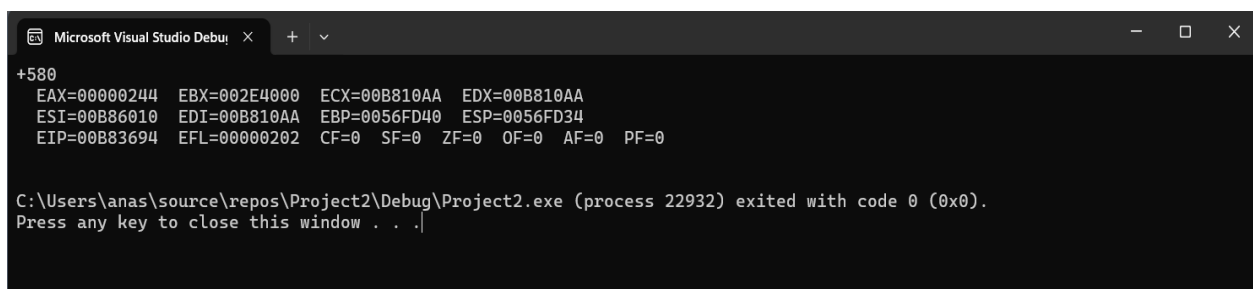
```
+580
  EAX=00000244  EBX=002E4000  ECX=00B810AA  EDX=00B810AA
  ESI=00B86010  EDI=00B810AA  EBP=0056FD40  ESP=0056FD34
  EIP=00B83694  EFL=00000202  CF=0  SF=0  ZF=0  OF=0  AF=0  PF=0


C:\Users\anas\source\repos\Project2\Debug\Project2.exe (process 22932) exited with code 0 (0x0).
Press any key to close this window . . .
```

Q7

Code:

```
INCLUDE Irvine32.inc

.data
arrayB BYTE 60, 70, 80
arrayW WORD 150, 250, 350
arrayD DWORD 600, 1200, 1800
```

```
.code
main PROC

MOV ESI , 0
MOV EAX , 0
MOV AL , arrayB[ESI * TYPE arrayB] ;  arrayB[0 * 1] = arrayB[0] = AL
ADD ESI , 2
ADD AL , arrayB[ESI * TYPE arrayB]
call Writeint
call DumpRegs

call crlf

MOV ESI , 0
MOV EAX , 0
MOV AX , arrayW[ESI * TYPE arrayW]
ADD ESI , 2
ADD AX , arrayW[ESI * TYPE arrayW]
call Writeint
call DumpRegs

call crlf

MOV ESI , 0
MOV EAX , 0
MOV EAX , arrayD[ESI * TYPE arrayD]
ADD ESI , 2
ADD EAX , arrayD[ESI * TYPE arrayD]
call Writeint
call DumpRegs

exit
main ENDP
END main
```
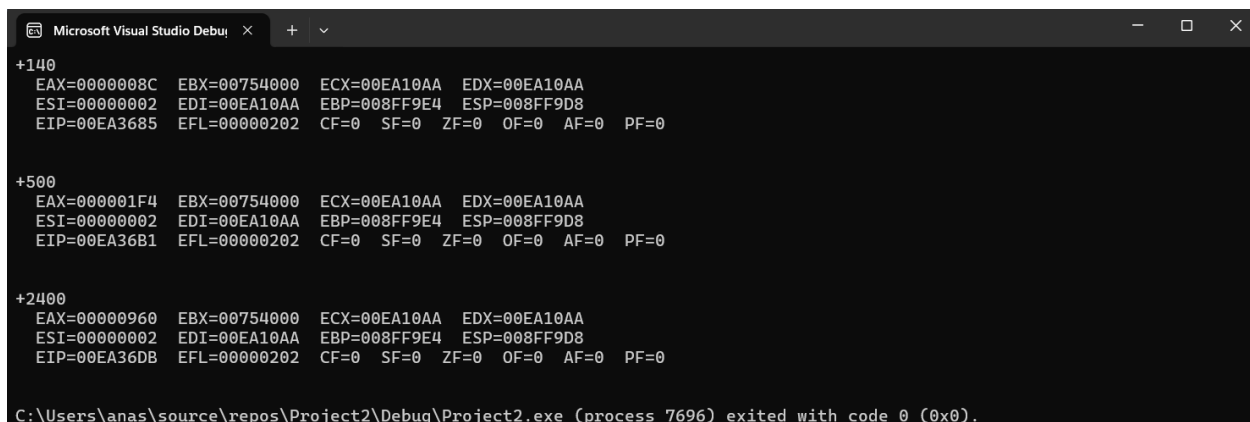


```
+140
  EAX=0000008C  EBX=00754000  ECX=00EA10AA  EDX=00EA10AA
  ESI=00000002  EDI=00EA10AA  EBP=008FF9E4  ESP=008FF9D8
  EIP=00EA3685  EFL=00000202  CF=0  SF=0  ZF=0  OF=0  AF=0  PF=0


+500
  EAX=000001F4  EBX=00754000  ECX=00EA10AA  EDX=00EA10AA
  ESI=00000002  EDI=00EA10AA  EBP=008FF9E4  ESP=008FF9D8
  EIP=00EA36B1  EFL=00000202  CF=0  SF=0  ZF=0  OF=0  AF=0  PF=0


+2400
  EAX=00000960  EBX=00754000  ECX=00EA10AA  EDX=00EA10AA
  ESI=00000002  EDI=00EA10AA  EBP=008FF9E4  ESP=008FF9D8
  EIP=00EA36DB  EFL=00000202  CF=0  SF=0  ZF=0  OF=0  AF=0  PF=0


C:\Users\anas\source\repos\Project2\Debug\Project2.exe (process 7696) exited with code 0 (0x0).
```