LAB 6

Questions:

Task: 1 Write a program that uses a loop to calculate the first ten numbers of Fibonacci sequence.

Task: 3 write a program to take input data for 5 employees and store it in appropriate variables. The program should ask for Employee ID, Name, Year of Birth & Annual Salary from the user. All variables should be stored in an array whose index represent employee number. The program should then calculate

the annual salary for all employees by adding all the elements in AnnualSalary array.

Task: 4 Initialize an array named Source and use a loop with indexed addressing to copy a string represented as an array of bytes with a null terminator value in an array named as target.

Task: 5 Use a loop with direct or indirect addressing to reverse the elements of an integer array in place. Do not copy elements to any other array. Use SIZEOF, TYPE and LENGTHOF operators to make program flexible.

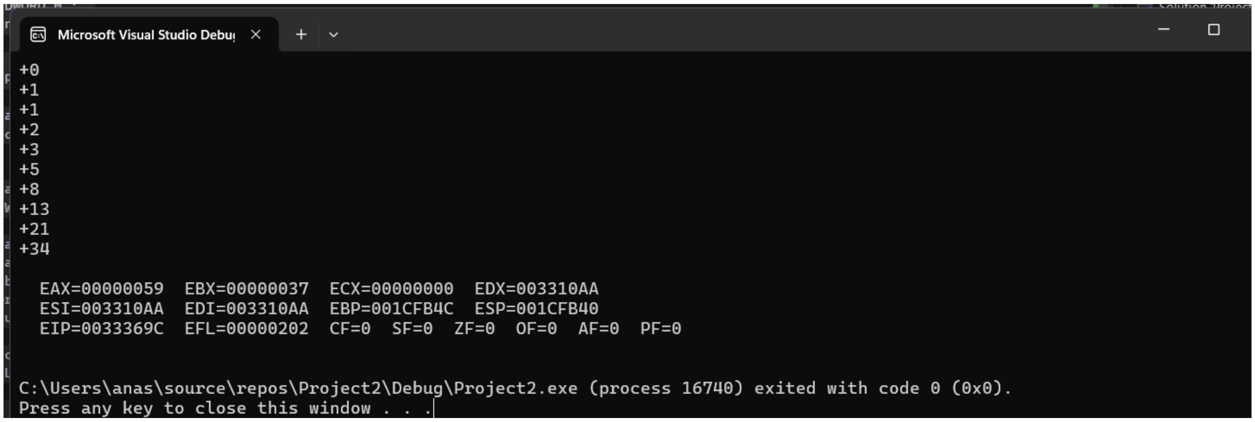
Task: 6 initialize a double word array consisting of elements 8, 5,1,2,6. Sort the given array in ascending order using bubble sort.

Q1

Code:

```
INCLUDE Irvine32.inc

.data
prev DWORD 0 ;
current DWORD 1 ;

.code
main PROC

mov eax , 0
mov ecx , 10 ; to run loop 10 times

L1:
mov eax , prev
call Writeint

mov eax , prev
add eax , current ; prev + current
mov ebx , current ;
mov prev , ebx ; update prev to current
mov current , eax ; update current to eax
```

```
call crlf
loop L1


call DumpRegs

exit
main ENDP
END main
```



```
+0
+1
+1
+2
+3
+5
+8
+13
+21
+34

  EAX=00000059  EBX=00000037  ECX=00000000  EDX=003310AA
  ESI=003310AA  EDI=003310AA  EBP=001CFB4C  ESP=001CFB40
  EIP=0033369C  EFL=00000202  CF=0  SF=0  ZF=0  OF=0  AF=0  PF=0


C:\Users\anas\source\repos\Project2\Debug\Project2.exe (process 16740) exited with code 0 (0x0).
Press any key to close this window . . .
```

Q2

Pattern :

1

11

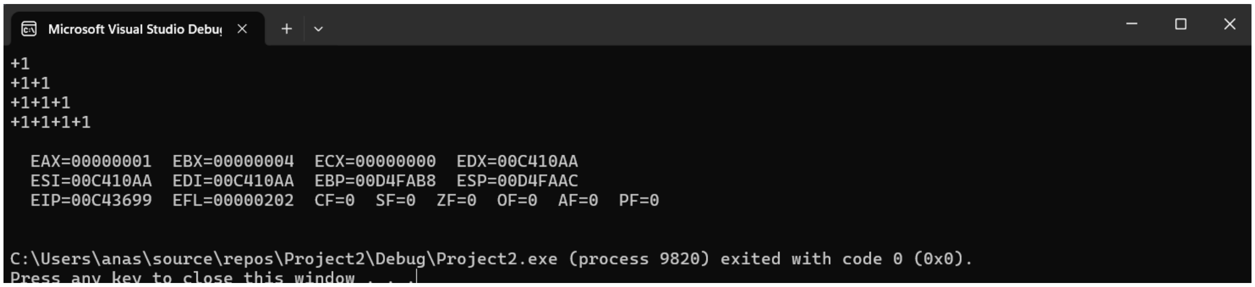
111

1111

Code:

```
INCLUDE Irvine32.inc

.data
count DWORD ? ; to save the outer loop count
var DWORD 1

.code
main PROC
mov eax , 0
mov ecx , 4 ; save the outer loop count (4 rows)
mov ebx , ecx ; save the outer loop count

L1:
      mov count , ecx  ; save the current outer loop count
      mov ecx , ebx ; restore the outer loop count
      sub ecx , count ; set inner loop count
      inc ecx
```

```
L2:
      mov eax , var ; load the character
      call Writeint

      loop L2 ; repeat the inner loop

      call crlf

      mov ecx , count

      loop L1

      call DumpRegs
      exit

exit
main ENDP
END main
```



```
+1
+1+1
+1+1+1
+1+1+1+1

  EAX=00000001  EBX=00000004  ECX=00000000  EDX=00C410AA
  ESI=00C410AA  EDI=00C410AA  EBP=00D4FAB8  ESP=00D4FAAC
  EIP=00C43699  EFL=00000202  CF=0  SF=0  ZF=0  OF=0  AF=0  PF=0


C:\Users\anas\source\repos\Project2\Debug\Project2.exe (process 9820) exited with code 0 (0x0).
Press any key to close this window . . .
```

Pattern :

1111

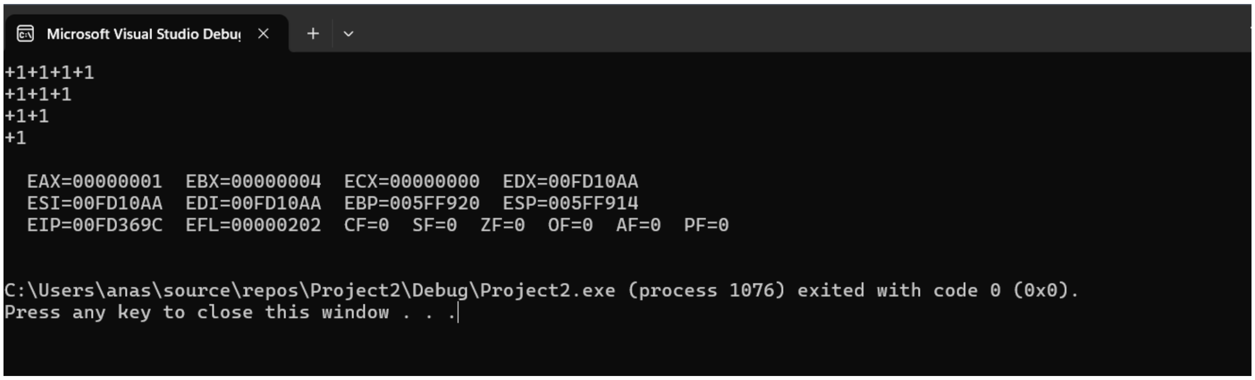
111

11

1

Code:

```
INCLUDE Irvine32.inc

.data
count DWORD ? ; to save the outer loop count
var DWORD 1

.code
main PROC
mov eax , 0
mov ecx , 4 ; save the outer loop count (4 rows)
mov ebx , ecx ; save the outer loop count

L1:
      mov count , ecx  ; save the current outer loop count
      mov ecx , count ; restore the inner loop count
L2:
      mov eax , var ; load the character
      call Writeint
      loop L2 ; repeat the inner loop

      call crlf

      mov ecx , count

      loop L1 ; by calling this it is automatically decrementing ecx by 1

      call DumpRegs
      exit


exit
main ENDP
END main
```



```
+1+1+1+1
+1+1+1
+1+1
+1

  EAX=00000001  EBX=00000004  ECX=00000000  EDX=00FD10AA
  ESI=00FD10AA  EDI=00FD10AA  EBP=005FF920  ESP=005FF914
  EIP=00FD369C  EFL=00000202  CF=0  SF=0  ZF=0  OF=0  AF=0  PF=0


C:\Users\anas\source\repos\Project2\Debug\Project2.exe (process 1076) exited with code 0 (0x0).
Press any key to close this window . . .
```

Pattern:

4321

432

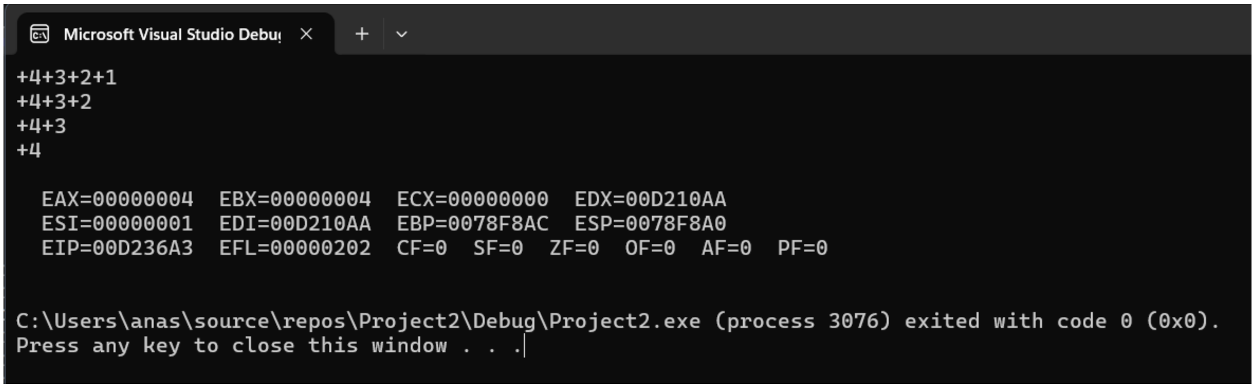
43

4

Code:

```
INCLUDE Irvine32.inc

.data
count DWORD ? ; to save the outer loop count
var1 DWORD 4 , 3 , 2, 1

.code
main PROC
mov eax , 0
mov esi , 0
mov ecx , 4 ; save the outer loop count (4 rows)
mov ebx , ecx ; save the outer loop count

L1:
      mov esi , 0 ; reset index to 0 for each row
      mov count , ecx  ; save the current outer loop count
      mov ecx , count ; set ecx to print number of items
```

```
L2:
      mov eax , var1[esi *TYPE var1] ; load the character
      call Writeint
      inc esi
      loop L2 ; repeat the inner loop

      call crlf

      mov ecx , count

      loop L1
      call DumpRegs
      exit

exit
main ENDP
END main
```



```
+4+3+2+1
+4+3+2
+4+3
+4

  EAX=00000004  EBX=00000004  ECX=00000000  EDX=00D210AA
  ESI=00000001  EDI=00D210AA  EBP=0078F8AC  ESP=0078F8A0
  EIP=00D236A3  EFL=00000202  CF=0  SF=0  ZF=0  OF=0  AF=0  PF=0


C:\Users\anas\source\repos\Project2\Debug\Project2.exe (process 3076) exited with code 0 (0x0).
Press any key to close this window . . .
```

Pattern:

1234

123

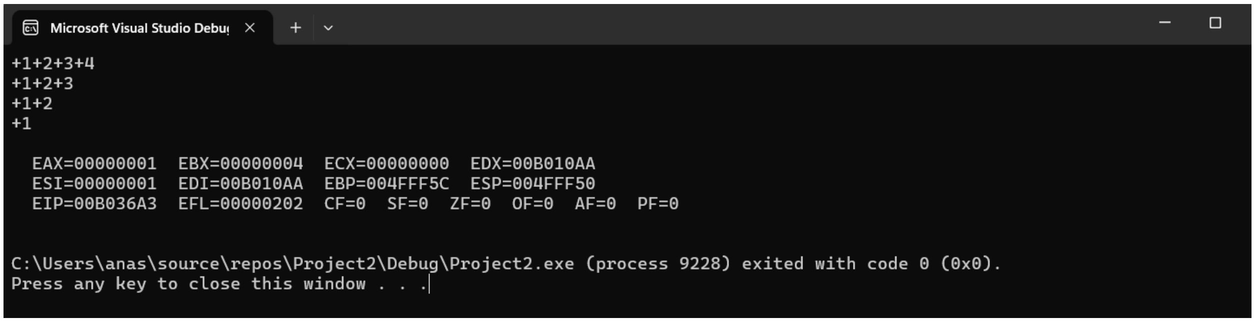
12

1

Code:

```
INCLUDE Irvine32.inc

.data
count DWORD ? ; to save the outer loop count
var1 DWORD 1 , 2 , 3, 4

.code
main PROC
mov eax , 0
mov esi , 0
mov ecx , 4 ; save the outer loop count (4 rows)
mov ebx , ecx ; save the outer loop count

L1:
      mov esi , 0 ; reset index to 0 for each row
```

```
        mov count , ecx  ; save the current outer loop count
        mov ecx , count ; set ecx to print number of items

L2:
        mov eax , var1[esi *TYPE var1] ; load the character
        call Writeint
        inc esi
        loop L2 ; repeat the inner loop

        call crlf

        mov ecx , count

        loop L1
        call DumpRegs
        exit

exit
main ENDP
END main
```



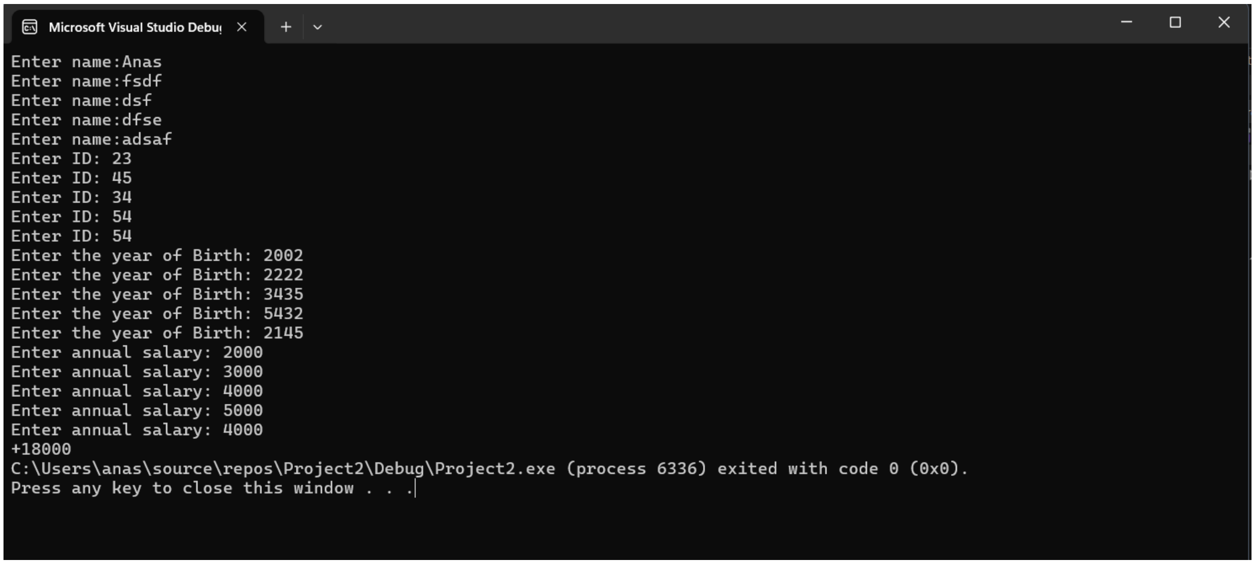
```
+1+2+3+4
+1+2+3
+1+2
+1

  EAX=00000001  EBX=00000004  ECX=00000000  EDX=00B010AA
  ESI=00000001  EDI=00B010AA  EBP=004FFF5C  ESP=004FFF50
  EIP=00B036A3  EFL=00000202  CF=0  SF=0  ZF=0  OF=0  AF=0  PF=0


C:\Users\anas\source\repos\Project2\Debug\Project2.exe (process 9228) exited with code 0 (0x0).
Press any key to close this window . . .
```

Q3

Code:

```
INCLUDE Irvine32.inc

.data
nameArray BYTE 5 DUP(20 DUP(?))
ID DWORD 5 DUP(?)
Birth DWORD 5 DUP(?)
AnnualSalary DWORD 5 DUP(?)

promptName BYTE "Enter name:",0
promptID BYTE "Enter ID: " , 0
promptBirth BYTE "Enter the year of Birth: " , 0
promptAS BYTE "Enter annual salary: " , 0
newline BYTE 0Dh, 0Ah,0

.code
main PROC

mov ebx,5 ; set up a counter to read info
mov ecx,5 ; set up a loop counter
mov esi, offset nameArray
;entering data in array
```

```
label1:
      mov edx, offset promptName ; Load the address of the prompt message
    call Writestring
      mov edx,esi
      mov ecx,20
      call Readstring
      add esi,20
      dec ebx
      mov ecx,ebx

      loop label1

      ;Entering IDs
      mov ebx,5
      mov ecx,5
      mov esi, offset ID



label2:
      mov edx, offset promptID ; Load the address of the prompt message
    call Writestring
      call Readint
      mov [esi] , eax
      add esi , 4 ; since ID is of DWORD
      dec ebx
      mov ecx , ebx

      loop label2

      ;Entering birth years
      mov ebx , 5
      mov ecx , 5
      mov esi , offset Birth

label3:
      mov edx , offset promptBirth
      call Writestring
      call Readint
      mov [esi] , eax ; integer tou eax mai hi ata hai
      add esi , 4 ;
      dec ebx
      mov ecx , ebx

      loop label3

      ;Entering annual salaries
      mov ebx  , 5
      mov ecx , 5
      mov esi , offset AnnualSalary

label4:
      mov edx , offset promptAS
      call Writestring
      call Readint
      mov [esi] , eax
      add esi , 4
      dec ebx
      mov ecx , ebx
      loop label4
      mov ecx , 5
      mov esi , 0
      mov eax , 0

;to calculate total annual salaries
label5:
      add eax , AnnualSalary[esi * TYPE AnnualSalary]
      inc esi

      loop label5

      call Writeint ; printing salaries

exit
main ENDP
END main
```

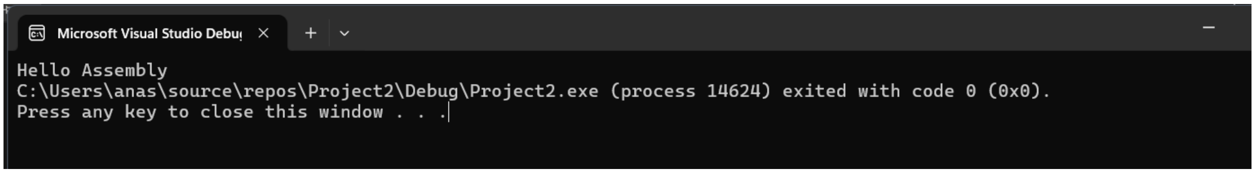


```
Enter name:Anas
Enter name:fsdf
Enter name:dsf
Enter name:dfse
Enter name:adsaf
Enter ID: 23
Enter ID: 45
Enter ID: 34
Enter ID: 54
Enter ID: 54
Enter the year of Birth: 2002
Enter the year of Birth: 2222
Enter the year of Birth: 3435
Enter the year of Birth: 5432
Enter the year of Birth: 2145
Enter annual salary: 2000
Enter annual salary: 3000
Enter annual salary: 4000
Enter annual salary: 5000
Enter annual salary: 4000
+18000
C:\Users\anas\source\repos\Project2\Debug\Project2.exe (process 6336) exited with code 0 (0x0).
Press any key to close this window . . .
```

Q4

Code:

```
INCLUDE Irvine32.inc

.data
Source BYTE "Hello Assembly" , 0 ; 0 here represents null terminator
target BYTE 20 DUP(?)


.code
main PROC
mov edx , 0
mov esi , 0
mov edi , 0
mov ecx , 20

label1:
      mov al , Source[esi * TYPE Source]
      mov target[edi] , al
      cmp al , 0 ; check if al has encountered null terminator
      je done ; if yes then end the loop (means move to done label and end this
label)
      inc esi
      inc edi

      jmp label1 ; jump to label 1(repeat)

done:
    mov edx, offset target         ; Load target address
    call Writestring               ; Print the copied string
    exit

mov edx , offset target
call Writestring



exit
main ENDP
END main
```



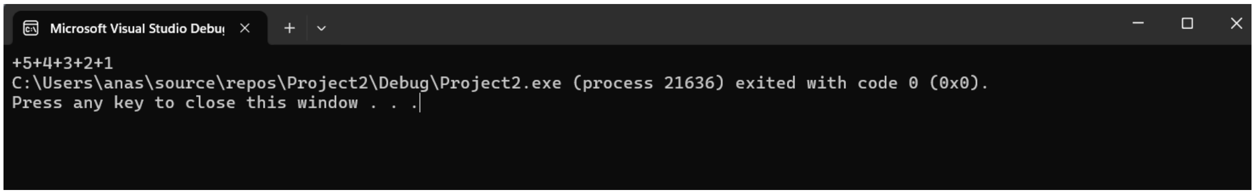
```
Hello Assembly
C:\Users\anas\source\repos\Project2\Debug\Project2.exe (process 14624) exited with code 0 (0x0).
Press any key to close this window . . .
```

Q5

Code:

```
INCLUDE Irvine32.inc

.data
arrayint DWORD 1 , 2 , 3 , 4 , 5

.code
main PROC
mov eax , 0
mov ebx , 0
mov esi , 0
mov edi , LENGTHOF arrayint
sub edi , 1
mov ecx , LENGTHOF arrayint
shr ecx , 1 ; divide ecx by 2

label1:
;swapping elements
      mov eax , arrayint[esi * TYPE arrayint]
      mov ebx , arrayint[edi * TYPE arrayint]
      mov arrayint[esi * TYPE arrayint] , ebx
      mov arrayint[edi * TYPE arrayint] , eax


      dec edi
```

```
       inc esi

       loop label1

mov eax , 0
mov esi , 0
mov ecx , LENGTHOF arrayint
label2:
       mov eax , arrayint[esi * TYPE arrayint]
       call Writeint
       inc esi
       loop label2
       exit

exit
main ENDP
END main
```



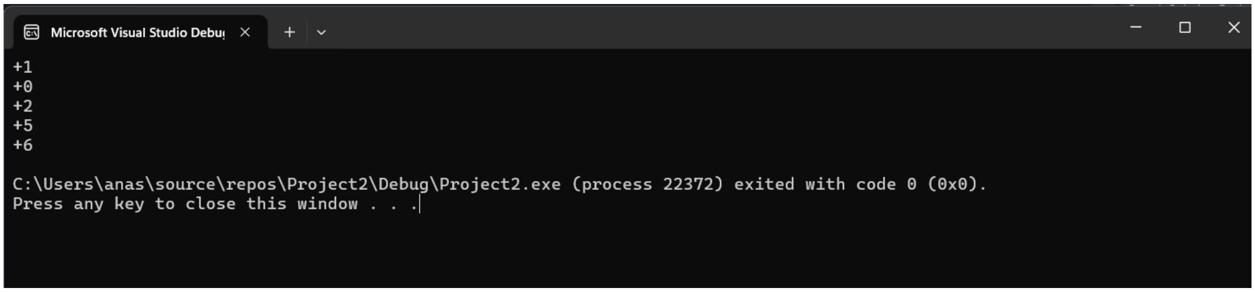
```
+5+4+3+2+1
C:\Users\anas\source\repos\Project2\Debug\Project2.exe (process 21636) exited with code 0 (0x0).
Press any key to close this window . . .
```

Q6

Code:

```
INCLUDE Irvine32.inc

.data
array DWORD  8, 5, 1, 2, 6

.code
main PROC

;clearing registers
mov eax , 0
mov ebx , 0
mov ecx , 0
mov edx , 0
mov esi , 0
mov edi , LENGTHOF array

;(outer loop)
label2:
       mov esi , 0

;(inner loop)
label1:
       mov eax , array[esi * TYPE array]
       inc esi
       mov ebx , array[esi * TYPE array] ; move to the adjacent element
       dec esi
       cmp eax , ebx
```

```
      JLE no_swap ; if current <=swap then no need to swap

      ;if not , then need to perform swapping
      mov array[esi * TYPE array] , ebx
      inc esi
      mov array[esi * TYPE array] , eax
      dec esi

no_swap:
      inc esi
      cmp esi , edi
      JL label1

      dec edi
      cmp edi , 1 ; compare if edi has reached the first element
      JG label2 ; if greater then jump to label2 (outer loop) else move to
printing the sorted array


;Printing the sorted array
mov esi, 0
print_loop:
    mov eax, array[esi * TYPE array]
    call Writeint
    call crlf
    inc esi
    cmp esi, LENGTHOF array ; Check if all elements are printed
    jl print_loop ; Continue printing if not

exit
main ENDP
END main
```



```
+1
+0
+2
+5
+6

C:\Users\anas\source\repos\Project2\Debug\Project2.exe (process 22372) exited with code 0 (0x0).
Press any key to close this window . . .
```