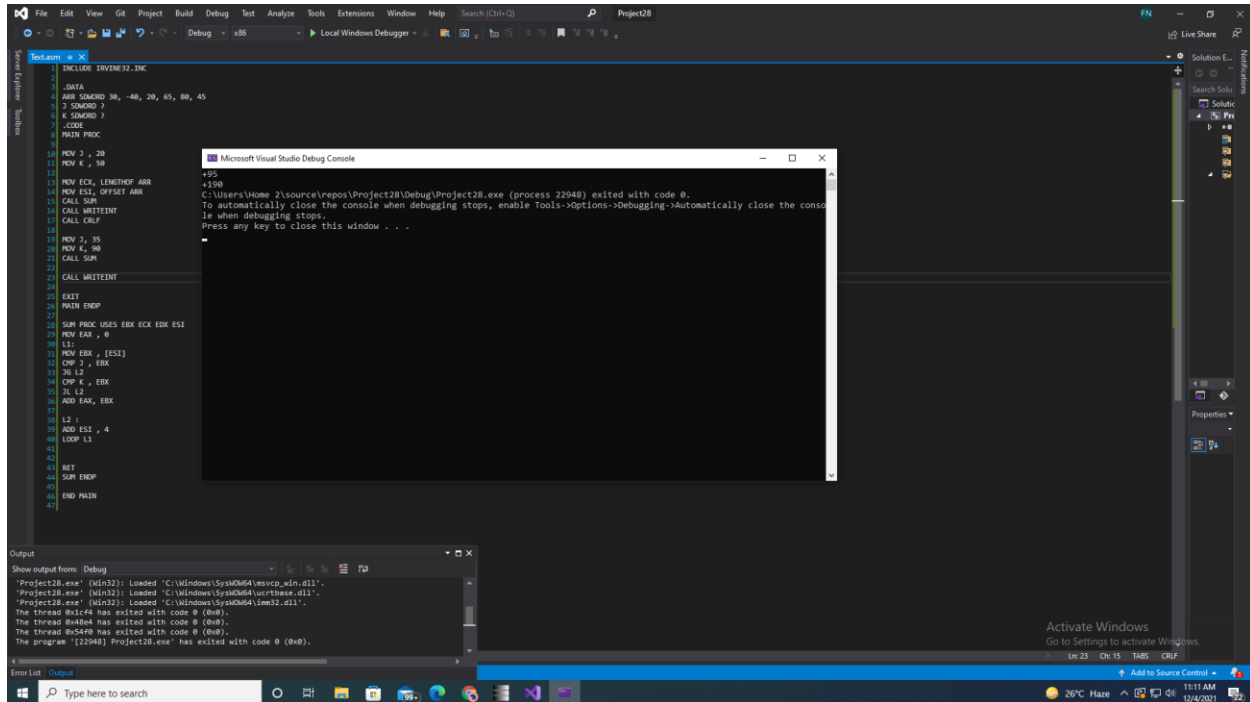


ASSIGNMENT NO 2

K200368 HAMMAD SHAKEEL

Q NO 1:

RESULT:



DOCUMENTATION:

We pass the length of the array and the address of the array using the registers and call the function. Now firstly, we are preserving the values of the registers the initializing our register EAX to 0 for adding purposes. Then we are traversing the entire array to find the number that falls within the given ranges. If it falls, then it add the number to EAX and then moving the pointer to point to the next index of the array. After traversing the entire array it simply return the function and the value of the sum through the EAX register.

CODE :

INCLUDE IRVINE32.INC

.DATA

ARR SDWORD 30, -40, 20, 65, 80, 45

J SDWORD ?

K SDWORD ?

.CODE

MAIN PROC

MOV J , 20

MOV K , 50

MOV ECX, LENGTHOF ARR

MOV ESI, OFFSET ARR

CALL SUM

CALL WRITEINT

CALL CRLF

MOV J, 35

MOV K, 90

CALL SUM

CALL WRITEINT

EXIT

MAIN ENDP

SUM PROC USES EBX ECX EDX ESI

MOV EAX , 0

L1:

MOV EBX , [ESI]

CMP J , EBX

JG L2

CMP K , EBX

JL L2

ADD EAX, EBX

L2 :

ADD ESI , 4

LOOP L1

RET

SUM ENDP

END MAIN

Q NO 2:

RESULT:

The screenshot displays the Microsoft Visual Studio IDE with the assembly code for 'Project28' in the main editor. The code includes a main procedure that initializes an array, calls a sorting function, and prints the sorted array. A debug console window is open, showing the output of the program: 'THE SORTED ARRAY IS : 4 7 17 45 60 68'. The output window at the bottom shows the execution of 'Project28.exe' and the loading of system DLLs. The Windows taskbar at the bottom indicates the system time as 12:40 PM on 12/4/2021.

```
Test.asm
1  INCLUDE Irvine32.inc
2
3  .DATA
4  STR1 BYTE "THE SORTED ARRAY IS : ", 0
5  ARRAY DWORD 60, 4, 17, 45, 7
6  .CODE
7
8  MAIN PROC
9
10 MOV ECK, LENGTHOF ARRAY
11 MOV ESI, OFFSET ARRAY
12 CALL SORT
13 MOV ECK, LENGTHOF ARRAY
14
15 MOV EDI, OFFSET STR1
16 CALL WRITESTRING
17
18 L1:
19 MOV EAX, [ESI]
20 CALL CRLF
21 CALL WRITEDEC
22 ADD ESI, 4
23 LOOP L1
24
25 EXIT
26 MAIN ENDP
27
28 SORT PROC
29
30 MOV EDI, ESI
31
32 L3:
33 MOV EAX, [ESI]
34 PUSH ECK
35
36 L2:
37
38 CMP EAX, [ESI]
39 JG L3
40
41 MOV EAX, [ESI]
42 MOV EBX, ESI
43 L3:
44 ADD ESI, 4
45 LOOP L2
46 SUB ESI, 4
47 CALL Swap
48
49 POP ECK
50 MOV ESI, EDI
51 LOOP L1
52 RET
53 SORT ENDP
54
```

Microsoft Visual Studio Debug Console

THE SORTED ARRAY IS :
4
7
17
45
60
68
C:\Users\Home\1\source\repos\Project28\Debug\Project28.exe (process 6624) 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

"Project28.exe" (x86_32): Loaded "C:\Windows\System32\user32.dll".
"Project28.exe" (x86_32): Loaded "C:\Windows\System32\user32.dll".

Activate Windows
Go to Settings to activate Windows.

12:40 PM
12/4/2021

CODE :

```
INCLUDE IRVINE32.INC
```

```
.DATA
```

```
STR1 BYTE "THE SORTED ARRAY IS : " , 0
```

```
ARRAY DWORD 60, 4, 17, 45, 7
```

```
.CODE
```

```
MAIN PROC
```

```
MOV ECX, LENGTHOF ARRAY
```

```
MOV ESI, OFFSET ARRAY
```

```
CALL SORT
```

```
MOV ECX, LENGTHOF ARRAY
```

```
MOV EDX, OFFSET STR1
```

```
CALL WRITESTRING
```

```
L1:
```

```
MOV EAX, [ESI]
```

```
CALL CRLF
```

```
CALL WRITEDEC
```

```
ADD ESI, 4
```

```
LOOP L1
```

```
EXIT
```

```
MAIN ENDP
```

```
SORT PROC
```

MOV EDX, ESI

L1:

MOV EAX, [ESI]

PUSH ECX

L2:

CMP EAX, [ESI]

JG L3

MOV EAX, [ESI]

MOV EBX, ESI

L3:

ADD ESI, 4

LOOP L2

SUB ESI, 4

CALL SWAP

POP ECX

MOV ESI, EDX

LOOP L1

RET

SORT ENDP

SWAP PROC

XCHG EAX, [ESI]

MOV ESI, EBX

MOV [ESI], EAX

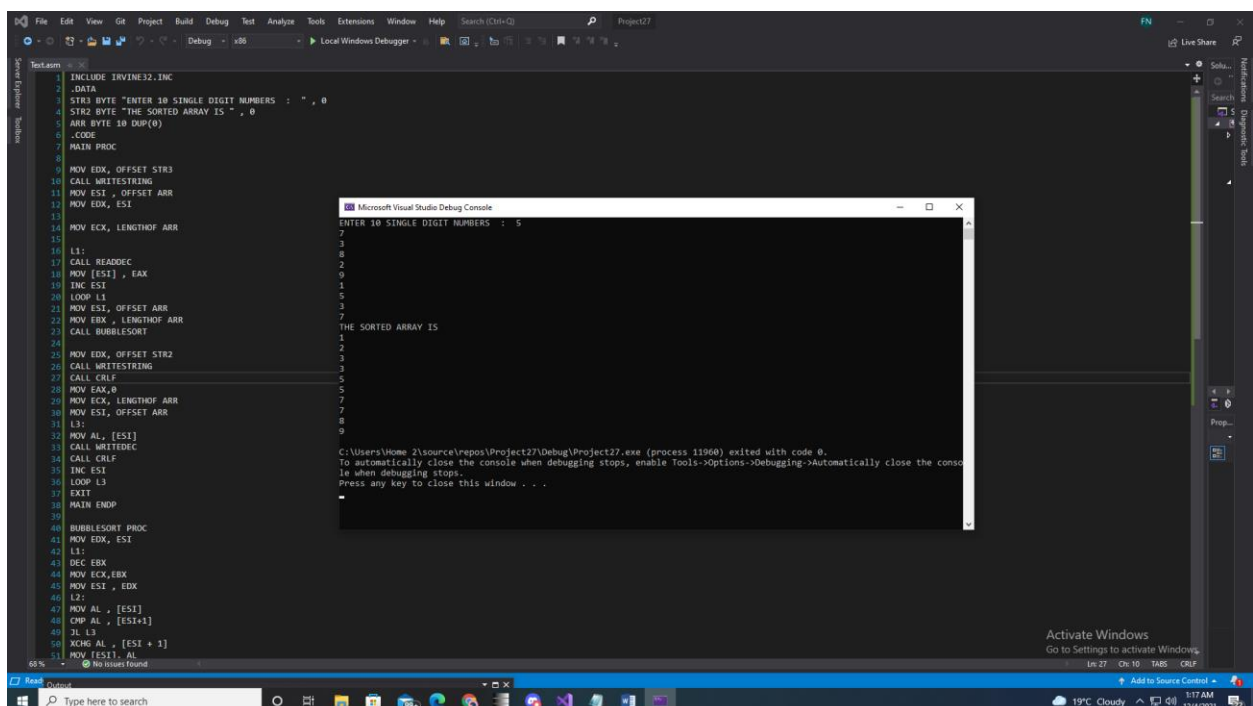
RET

SWAP ENDP

END MAIN

Q NO 3:

RESULT:



The screenshot shows the Microsoft Visual Studio IDE with a project named 'Project27'. The assembly code in 'Test.asm' is as follows:

```
1 INCLUDE Irvine32.inc
2 .DATA
3 STR3 BYTE "ENTER 10 SINGLE DIGIT NUMBERS : ", 0
4 STR2 BYTE "THE SORTED ARRAY IS ", 0
5 ARR BYTE 10 DUP(0)
6 .CODE
7 MAIN PROC
8
9     MOV EDI, OFFSET STR3
10    CALL WRITESTRING
11    MOV ESI, OFFSET ARR
12    MOV EDI, ESI
13
14    MOV EAX, LENGTHOF ARR
15    L1:
16    CALL READDEC
17    MOV [ESI], EAX
18    INC ESI
19    LOOP L1
20    MOV ESI, OFFSET ARR
21    MOV EBX, LENGTHOF ARR
22    CALL BUBBLESORT
23
24    MOV EDI, OFFSET STR2
25    CALL WRITESTRING
26    CALL CRLF
27    MOV EAX, 0
28    MOV ECX, LENGTHOF ARR
29    MOV ESI, OFFSET ARR
30    L3:
31    MOV AL, [ESI]
32    CALL WRITEDEC
33    CALL CRLF
34    INC ESI
35    LOOP L3
36    EXIT
37 MAIN ENDP
38
39 BUBBLESORT PROC
40     MOV EDI, ESI
41     L1:
42     DEC EBX
43     MOV ECX, EBX
44     MOV ESI, EDI
45     L2:
46     MOV AL, [ESI]
47     CMP AL, [ESI+1]
48     JLE L3
49     XCHG AL, [ESI+1]
50     MOV [ESI], AL
51     INC ESI
52     LOOP L2
53     MOV ESI, EDI
54     INC EDI
55     LOOP L1
56     RET
```

The 'Microsoft Visual Studio Debug Console' window shows the following output:

```
ENTER 10 SINGLE DIGIT NUMBERS : 5
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```

MAIN PROC

MOV EDX, OFFSET STR3

CALL WRITESTRING

MOV ESI , OFFSET ARR

MOV EDX, ESI

MOV ECX, LENGTHOF ARR

L1:

CALL READDEC

MOV [ESI] , EAX

INC ESI

LOOP L1

MOV ESI, OFFSET ARR

MOV EBX , LENGTHOF ARR

CALL BUBBLESORT

MOV EDX, OFFSET STR2

CALL WRITESTRING

CALL CRLF

MOV EAX,0

MOV ECX, LENGTHOF ARR

MOV ESI, OFFSET ARR

L3:

MOV AL, [ESI]

CALL WRITEDEC

CALL CRLF

INC ESI

```
LOOP L3  
EXIT  
MAIN ENDP
```

```
BUBBLESORT PROC
```

```
MOV EDX, ESI
```

```
L1:
```

```
DEC EBX
```

```
MOV ECX,EBX
```

```
MOV ESI , EDX
```

```
L2:
```

```
MOV AL , [ESI]
```

```
CMP AL , [ESI+1]
```

```
JL L3
```

```
XCHG AL , [ESI + 1]
```

```
MOV [ESI], AL
```

```
L3:
```

```
INC ESI
```

```
LOOP L2
```

```
MOV ECX,EBX
```

```
MOV ECX,EBX
```

```
LOOP L1
```

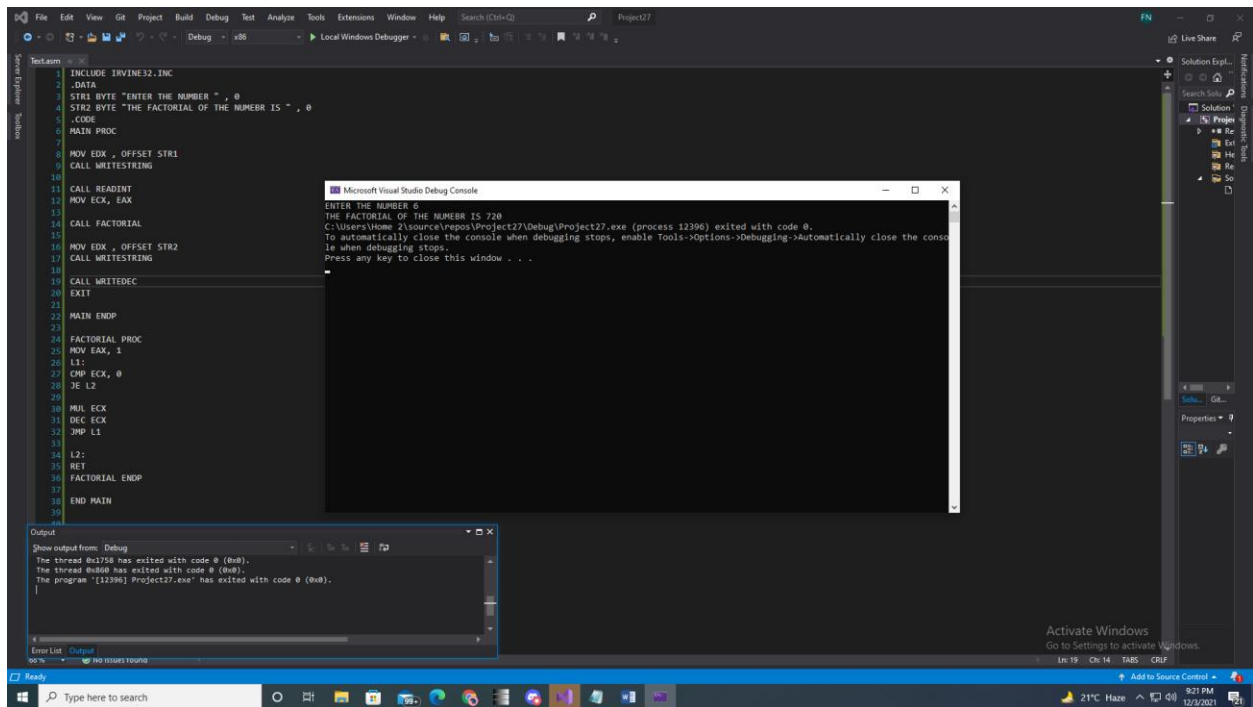
```
RET
```

```
BUBBLESORT ENDP
```

```
END MAIN
```

```
Q NO 4:
```


RESULT:



CODE :

```
INCLUDE IRVINE32.INC
```

```
.DATA
```

```
STR1 BYTE "ENTER THE NUMBER " , 0
```

```
STR2 BYTE "THE FACTORIAL OF THE NUMEBR IS " , 0
```

```
.CODE
```

```
MAIN PROC
```

```
MOV EDX , OFFSET STR1
```

```
CALL WRITESTRING
```

```
CALL READINT
```

```
MOV ECX, EAX
```

CALL FACTORIAL

MOV EDX , OFFSET STR2

CALL WRITESTRING

CALL WRITEINT

EXIT

MAIN ENDP

FACTORIAL PROC

MOV EAX, 1

L1:

CMP ECX, 0

JE L2

MUL ECX

DEC ECX

JMP L1

L2:

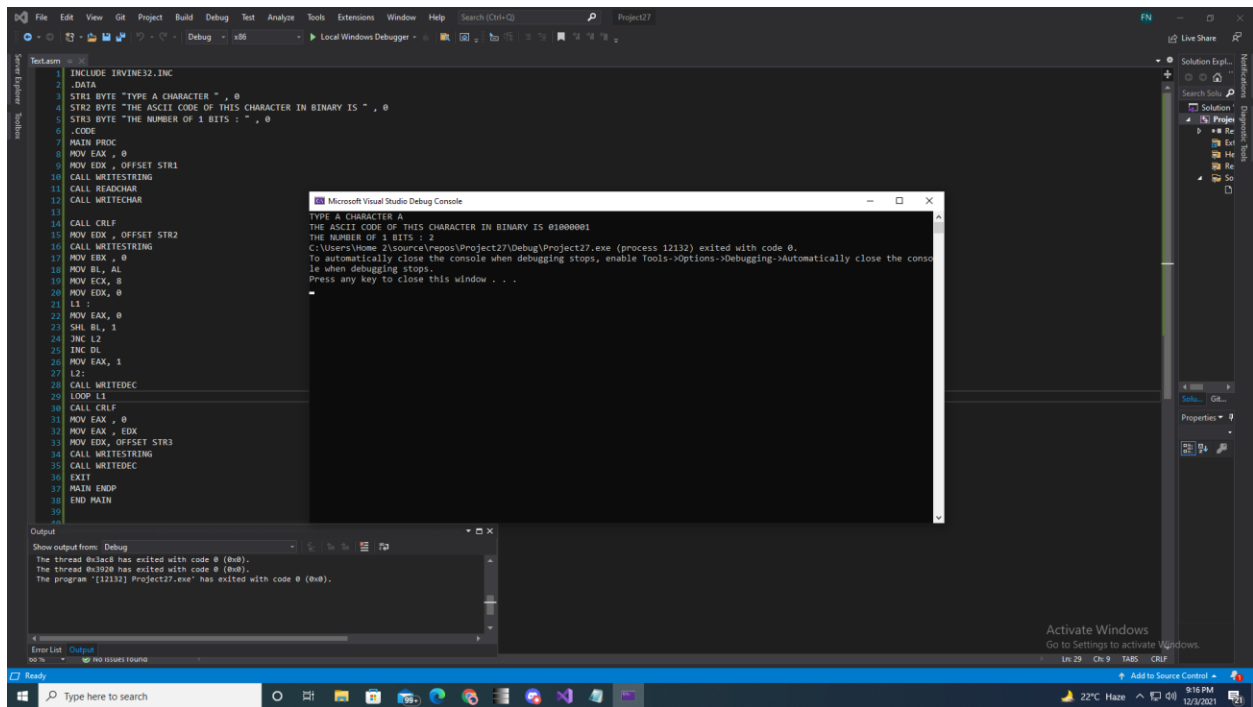
RET

FACTORIAL ENDP

END MAIN

Q NO 5:

RESULT:



CODE :

INCLUDE IRVINE32.INC

.DATA

STR1 BYTE "TYPE A CHARACTER " , 0

STR2 BYTE "THE ASCII CODE OF THIS CHARACTER IN BINARY IS " , 0

STR3 BYTE "THE NUMBER OF 1 BITS : " , 0

.CODE

MAIN PROC

MOV EAX , 0

MOV EDX , OFFSET STR1

CALL WRITESTRING

CALL READCHAR

CALL WRITECHAR

CALL CRLF

MOV EDX , OFFSET STR2

CALL WRITESTRING

MOV EBX , 0

MOV BL, AL

MOV ECX, 8

MOV EDX, 0

L1 :

MOV EAX, 0

SHL BL, 1

JNC L2

INC DL

MOV EAX, 1

L2:

CALL WRITEDEC

LOOP L1

CALL CRLF

MOV EAX , 0

MOV EAX , EDX

MOV EDX, OFFSET STR3

CALL WRITESTRING

CALL WRITEDEC

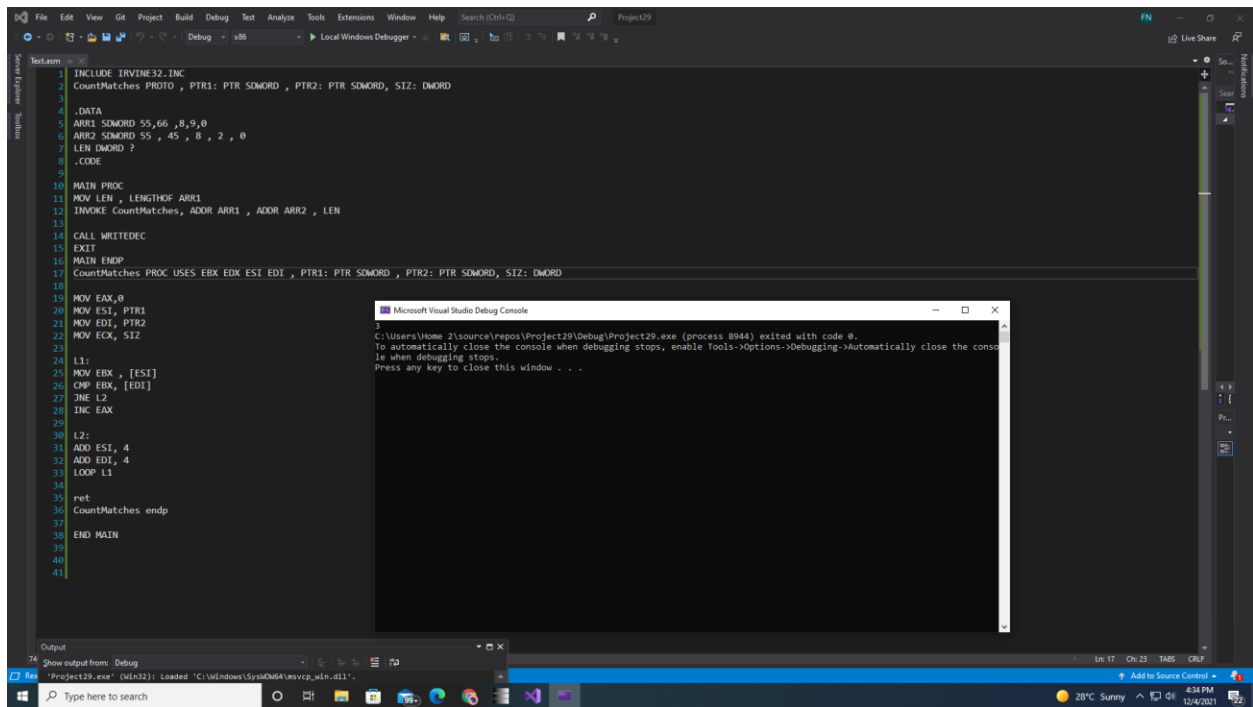
EXIT

MAIN ENDP

END MAIN

Q NO 6:

RESULT:



CODE :

```
INCLUDE Irvine32.inc
```

```
CountMatches PROTO , PTR1: PTR SDWORD , PTR2: PTR SDWORD, SIZ: DWORD
```

```
.DATA
```

```
ARR1 SDWORD 55,66 ,8,9,0
```

```
ARR2 SDWORD 55 , 45 , 8 , 2 , 0
```

```
LEN DWORD ?
```

```
.CODE
```

```
MAIN PROC
```

```
MOV LEN , LENGTHOF ARR1
```

```
INVOKE CountMatches, ADDR ARR1 , ADDR ARR2 , LEN
```

```
CALL WRITEDEC
```

```
EXIT
```

MAIN ENDP

CountMatches PROC USES EBX EDX ESI EDI , PTR1: PTR SDWORD , PTR2: PTR SDWORD, SIZ: DWORD

MOV EAX,0

MOV ESI, PTR1

MOV EDI, PTR2

MOV ECX, SIZ

L1:

MOV EBX , [ESI]

CMP EBX, [EDI]

JNE L2

INC EAX

L2:

ADD ESI, 4

ADD EDI, 4

LOOP L1

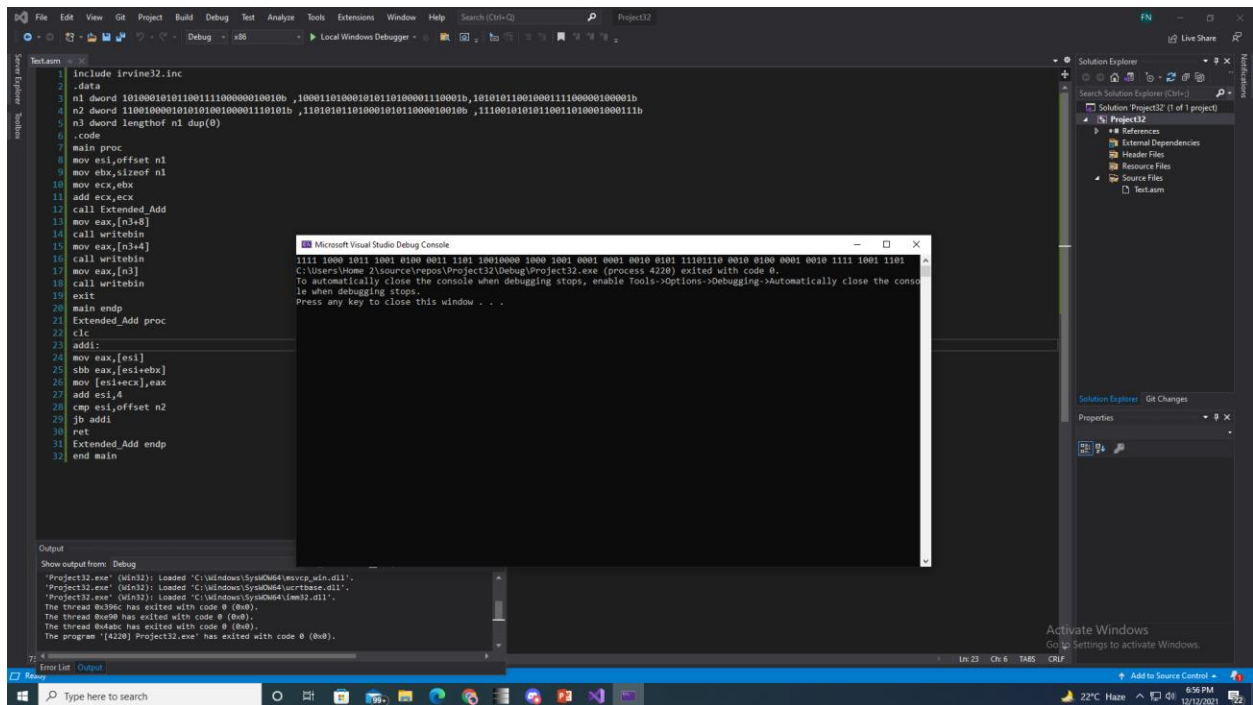
ret

CountMatches endp

END MAIN

Q NO 7:

RESULT:



CODE:

include Irvine32.inc

.data

n1 dword 10100010101100111100000010010b
,100011010001010110100001110001b,10101011001000111100000100001b

n2 dword 110010000101010100100001110101b ,11010101101000101011000010010b
,11100101010110011010001000111b

n3 dword lengthof n1 dup(0)

.code

main proc

mov esi,offset n1

mov ebx,sizeof n1

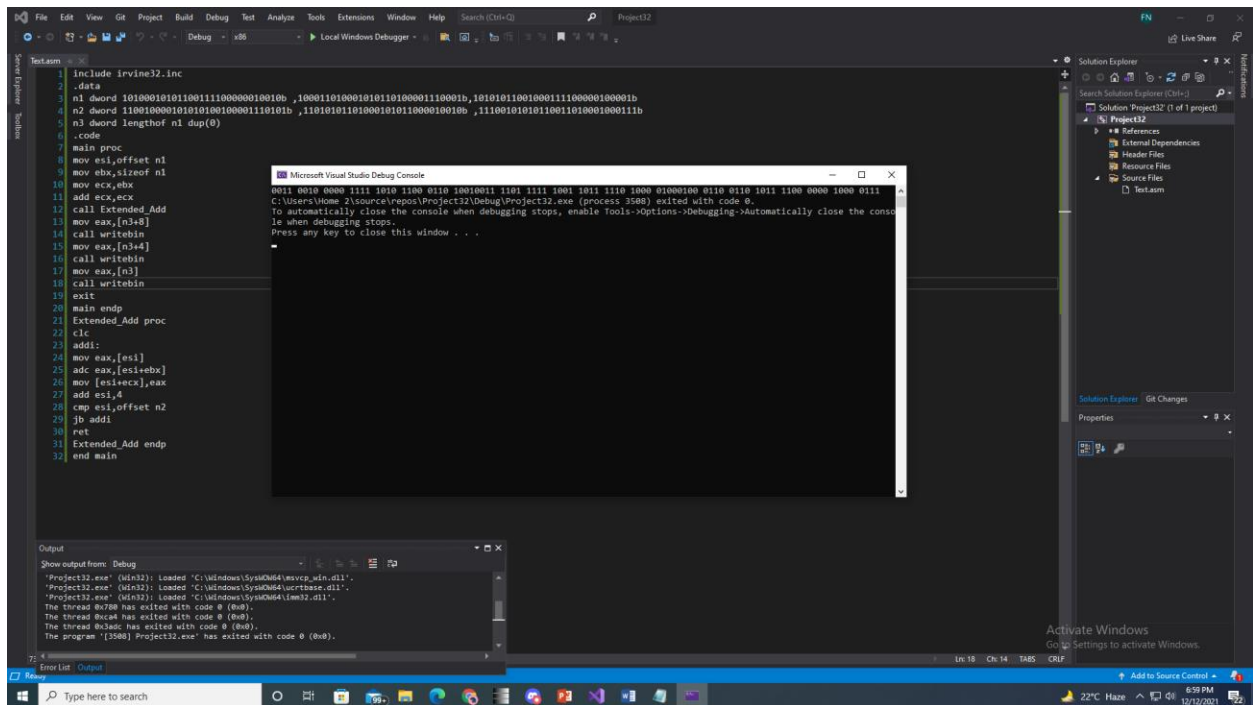
mov ecx,ebx

add ecx,ecx

call Extended_Add

mov eax,[n+8]

```
call writebin
mov eax,[n3+4]
call writebin
mov eax,[n3]
call writebin
exit
main endp
Extended_Add proc
clc
addi:
mov eax,[esi]
sbb eax,[esi+ebx]
mov [esi+ecx],eax
add esi,4
cmp esi,offset n2
jb addi
ret
Extended_Add endp
end main
Q NO 8:
RESULT:
```

CODE:

include Irvine32.inc

.data

n1 dword 10100010101100111100000010010b
 ,100011010001010110100001110001b,10101011001000111100000100001b

n2 dword 110010000101010100100001110101b ,11010101101000101011000010010b
 ,11100101010110011010001000111b

n3 dword lengthof n1 dup(0)

.code

main proc

mov esi,offset n1

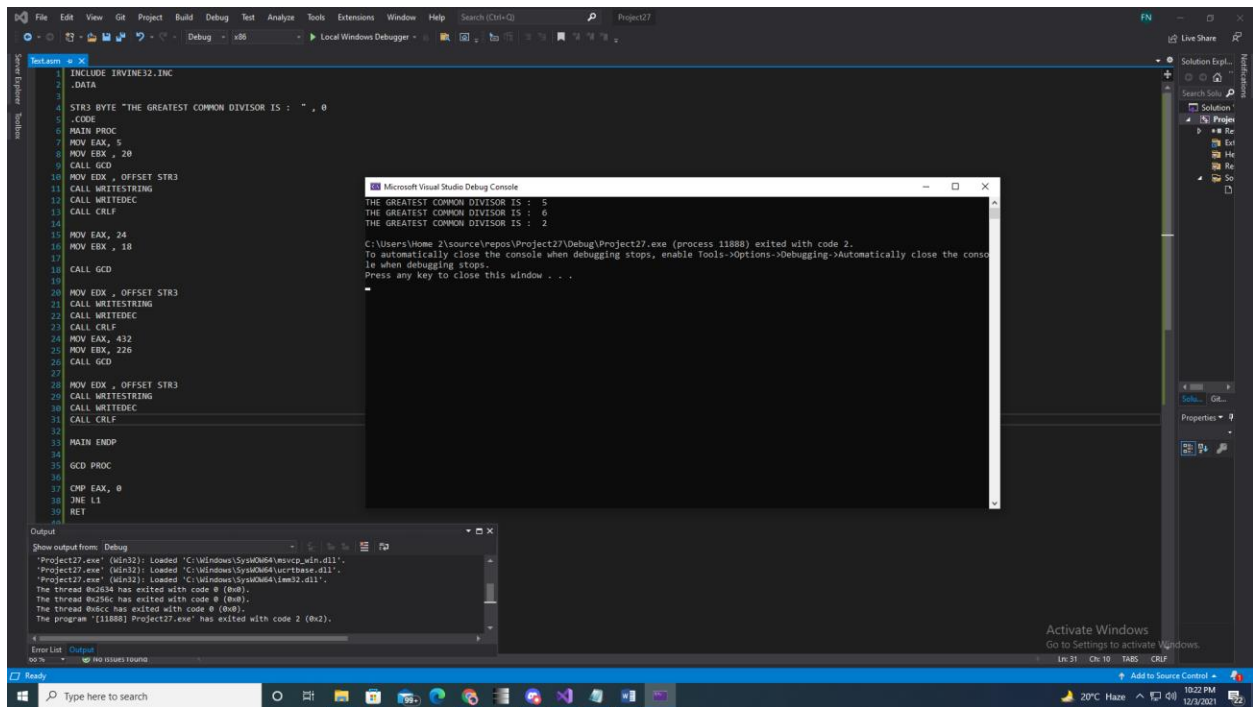
mov ebx,sizeof n1

mov ecx,ebx

add ecx,ecx

call Extended_Add

```
mov eax,[n3+8]
call writebin
mov eax,[n3+4]
call writebin
mov eax,[n3]
call writebin
exit
main endp
Extended_Add proc
clc
addi:
mov eax,[esi]
adc eax,[esi+ebx]
mov [esi+ecx],eax
add esi,4
cmp esi,offset n2
jb addi
ret
Extended_Add endp
end main
Q NO 9:
RESULT:
```



CODE :

INCLUDE IRVINE32.INC

.DATA

STR3 BYTE "THE GREATEST COMMON DIVISOR IS : ", 0

.CODE

MAIN PROC

MOV EAX, 5

MOV EBX , 20

CALL GCD

MOV EDX , OFFSET STR3

CALL WRITESTRING

CALL WRITEDEC

CALL CRLF

MOV EAX, 24

MOV EBX , 18

CALL GCD

MOV EDX , OFFSET STR3

CALL WRITESTRING

CALL WRITEDEC

CALL CRLF

MOV EAX, 432

MOV EBX, 226

CALL GCD

MOV EDX , OFFSET STR3

CALL WRITESTRING

CALL WRITEDEC

CALL CRLF

MAIN ENDP

GCD PROC

CMP EAX, 0

JNE L1

RET

L1:

CMP EBX, 0

JNE L2

RET

L2:

CMP EAX , EBX

JNE L3

RET

L3:

CMP EAX , EBX

JNG L4

SUB EAX , EBX

CALL GCD

RET

L4:

SUB EBX , EAX

CALL GCD

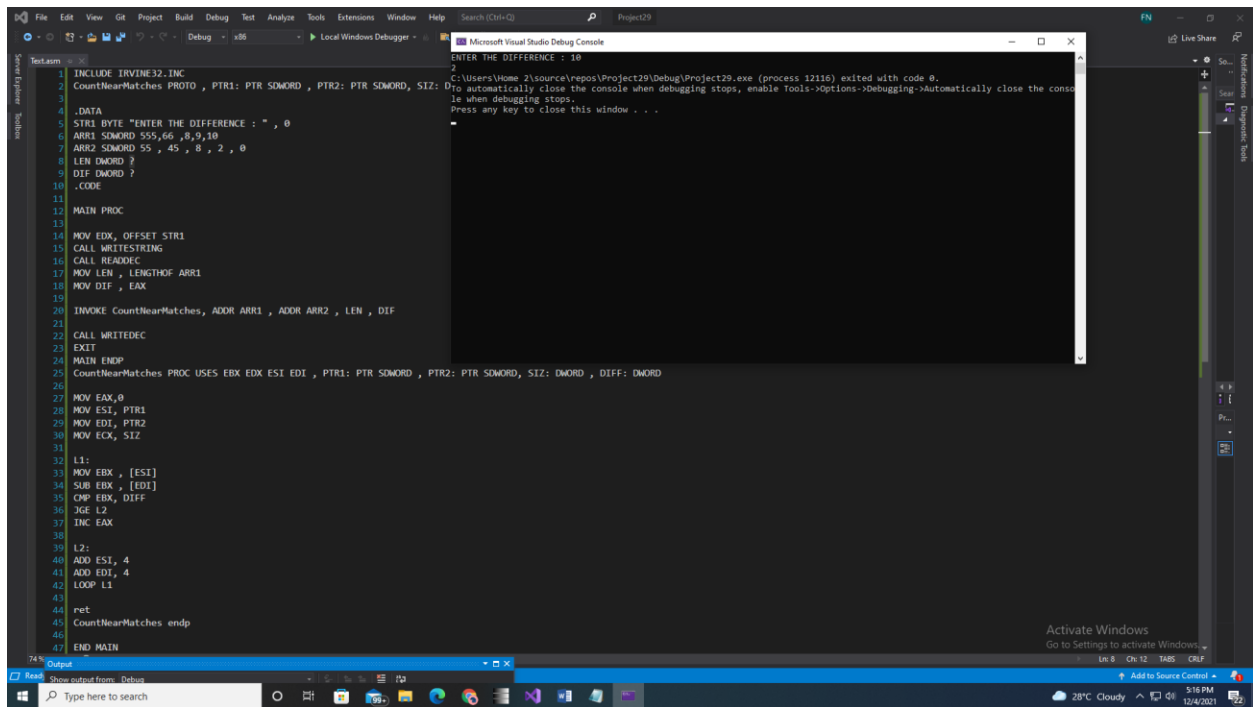
RET

GCD ENDP

END MAIN

Q NO 10

RESULT:



CODE:

INCLUDE IRVINE32.INC

CountNearMatches PROTO , PTR1: PTR SDWORD , PTR2: PTR SDWORD, SIZ: DWORD , DIFF: DWORD

.DATA

STR1 BYTE "ENTER THE DIFFERENCE : " , 0

ARR1 SDWORD 555,66 ,8,9,10

ARR2 SDWORD 55 , 45 , 8 , 2 , 0

LEN DWORD ?

DIF DWORD ?

.CODE

MAIN PROC

MOV EDX, OFFSET STR1

CALL WRITESTRING

CALL READDEC

MOV LEN , LENGTHOF ARR1

MOV DIF , EAX

INVOKE CountNearMatches, ADDR ARR1 , ADDR ARR2 , LEN , DIF

CALL WRITEDEC

EXIT

MAIN ENDP

CountNearMatches PROC USES EBX EDX ESI EDI , PTR1: PTR SDWORD , PTR2: PTR SDWORD, SIZ: DWORD
, DIFF: DWORD

MOV EAX,0

MOV ESI, PTR1

MOV EDI, PTR2

MOV ECX, SIZ

L1:

MOV EBX , [ESI]

SUB EBX , [EDI]

CMP EBX, DIFF

JGE L2

INC EAX

L2:

ADD ESI, 4

ADD EDI, 4

LOOP L1

ret

CountNearMatches endp

END MAIN