COAL LAB 10

23k-0575

Questions:

1. Write a program which contains a procedure named ThreeProd that displays the product of three numeric parameters passed through a stack.

2. Write a program which contains a procedure named MinMaxArray that displays the minimum & maximum values in an array. Pass a size-20 array by reference to this procedure.

3. Write a program which contains a procedure named LocalSquare . The procedure must declare a local variable. Initialize this variable by taking an input value from the user and then display its square. Use ENTER & LEAVE instructions to allocate and de-allocate the local variable.

4. Write a program to take 4 input numbers from the users. Then make two procedures CheckPrime and LargestPrime. The program should first check if a given number is a prime number or not. If all of the input numbers are prime numbers then the program should call the procedure LargestPrime.

CheckPrime: This procedure tests if a number is prime or not

LargestPrime: This procedure finds and displays the largest of the four prime numbers.

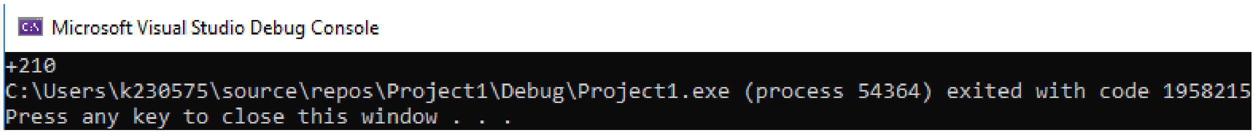
5. Write a program which contains a procedure named BubbleSort that sorts an array which is passed through a stack using indirect addressing.

Q1

Code:

```
INCLUDE Irvine32.inc

.data
var1 DWORD 5
var2 DWORD 6
var3 DWORD 7
```

```
.code
main PROC
push var1
push var2
push var3

call ThreeProd
call Writeint
exit
main ENDP

ThreeProd PROC
push ebp
mov ebp, esp
mov eax , [ebp+16]
mov ebx , [ebp+12]
mul ebx ; eax = eax(var1)*ebx(var2)
mov edx , [ebp+8]
mul edx
;call Writeint
pop ebp

ret 12
ThreeProd ENDP

END main
```



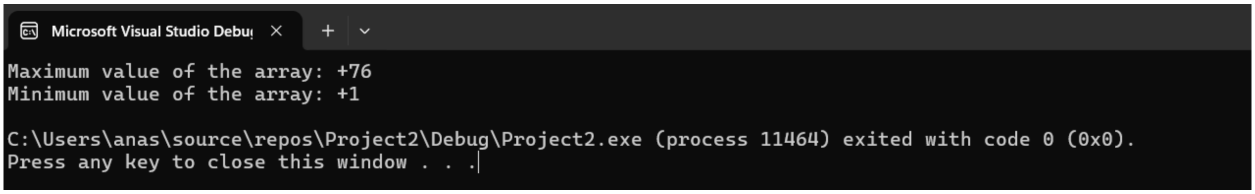
```
+210
C:\Users\k230575\source\repos\Project1\Debug\Project1.exe (process 54364) exited with code 1958215
Press any key to close this window . . .
```

Q2

Code:

```
INCLUDE Irvine32.inc

.data
arr DWORD 2,5,7,1,10,34,54,43,2,32,21,43,65,76,43,32,23,12,67,64
str1 BYTE "Maximum value of the array: " , 0
str2 BYTE "Minimum value of the array: " , 0


.code
main PROC
push offset arr

call MinMaxArray

exit
main ENDP

MinMaxArray PROC
push ebp
mov ebp, esp
pushad
```

```
;to find the max value of the array
mov ecx , LENGTHOF arr
mov esi , [ebp+8]
mov eax , [esi] ; load the first element of the array into eax

L1:
add esi , 4
cmp ecx , 1
je doneMax

mov ebx , [esi]
cmp eax , ebx
jg L2
mov eax , ebx

L2:
loop L1

doneMax:
mov edx , offset str1
call Writestring
call Writeint
call crlf

;to find the min value in the array
mov ecx , LENGTHOF arr
mov esi , [ebp+8]
mov eax , [esi] ; load the first element of the array into eax

L3:
add esi , 4
cmp ecx , 1
je doneMin
mov ebx , [esi]
cmp eax , ebx
jl L4
mov eax , ebx

L4:
loop L3

doneMin:
mov edx , offset str2
call Writestring
call Writeint
call crlf

popad
pop ebp
ret
MinMaxArray ENDP


exit
;main ENDP
END main
```

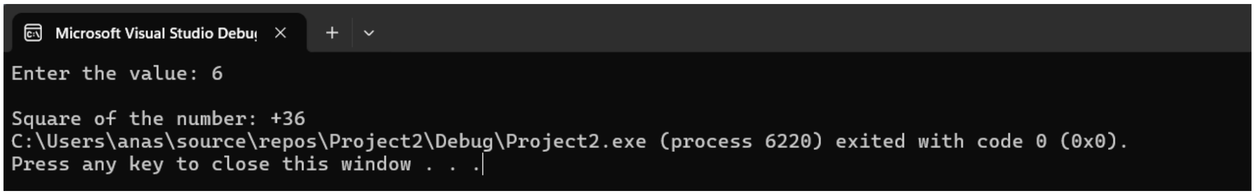


```
Maximum value of the array: +76
Minimum value of the array: +1

C:\Users\anas\source\repos\Project2\Debug\Project2.exe (process 11464) exited with code 0 (0x0).
Press any key to close this window . . .
```

Q3

Code:

```
INCLUDE Irvine32.inc

.data
str1 BYTE "Enter the value: " ,0
str2 BYTE "Square of the number: " , 0

.code
main PROC
call LocalSquare
exit
main ENDP


LocalSquare PROC

LOCAL temp : DWORD
enter 0 , 0
mov edx , offset str1
call Writestring
call Readint

mov temp , eax
mul eax

call crlf

mov edx , offset str2
call Writestring
call Writeint

leave
ret

LocalSquare ENDP

;exit
;main ENDP
END main
```



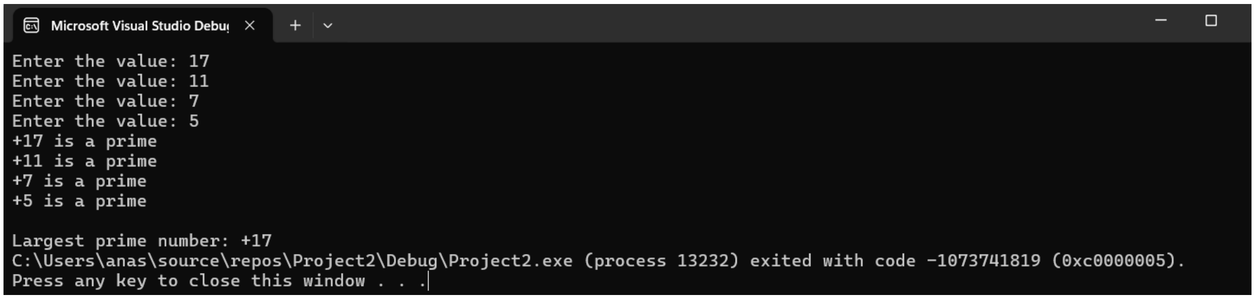
```
Enter the value: 6

Square of the number: +36
C:\Users\anas\source\repos\Project2\Debug\Project2.exe (process 6220) exited with code 0 (0x0).
Press any key to close this window . . .
```

Q4

Code:

```
INCLUDE Irvine32.inc

.data
str1 BYTE "Enter the value: " ,0
str2 BYTE " is a prime" , 0
str3 BYTE " is not a prime" , 0
str4 BYTE "Largest prime number: " , 0
var1 DWORD ?
var2 DWORD ?
var3 DWORD ?
var4 DWORD ?

count DWORD ?
notprime_count DWORD ?
primecount DWORD ?

.code
main PROC

mov count , 0
mov notprime_count , 0
mov primecount , 0

;taking input from the user
mov edx , offset str1
call Writestring
call Readint
mov var1 , eax

mov edx , offset str1
call Writestring
call Readint
mov var2 , eax

mov edx , offset str1
call Writestring
call Readint
mov var3 , eax

mov edx , offset str1
call Writestring
call Readint
mov var4 , eax

push var1
call CheckPrime

push var2
call CheckPrime

push var3
call CheckPrime

push var4
call CheckPrime

push var1 ; index = 20
push var2 ; index = 16
push var3 ; index = 12
push var4 ; index = 8

call LargestPrime

exit
main ENDP


CheckPrime PROC

push ebp
mov ebp, esp

mov eax , [ebp+8]
cmp eax , 2
jl notprime

mov ecx , 2

L1:
cmp ecx , eax
jge prime ; condition to exit loop and if ecx becomes greater than eax hence it is
prime

mov edx , 0
div ecx
cmp edx , 0
je notprime

inc ecx
jmp L1 ; repeat loop

prime:
inc primecount
mov eax , [ebp+8]
call Writeint
mov edx , offset str2
call Writestring
call crlf
jmp done

notprime:
inc notprime_count
mov eax , [ebp+8]
call Writeint
mov edx , offset str3
call Writestring
call crlf
jmp done


done:
pop ebp
ret
CheckPrime ENDP

;to check the largest primenumbers if all 4 numbers are prime

LargestPrime PROC
push ebp
```

```
mov ebp, esp

cmp primecount , 4
jne bye

mov eax , [ebp+8]
mov ebx , [ebp+12]
mov ecx , [ebp+16]
mov edx , [ebp+20]

cmp eax , ebx
jg compare2 ; if eax>ebx
mov eax , ebx

compare2:
cmp eax , ecx ; if eax>ecx
jg compare3
mov eax , ecx

compare3:
cmp eax , edx ; if eax > edx
jg largest
mov eax , edx

largest:
call crlf
mov edx , offset str4
call Writestring
call Writeint

ret
LargestPrime ENDP

bye:
exit


;main ENDP
END main
```



```
Enter the value: 17
Enter the value: 11
Enter the value: 7
Enter the value: 5
+17 is a prime
+11 is a prime
+7 is a prime
+5 is a prime

Largest prime number: +17
C:\Users\anas\source\repos\Project2\Debug\Project2.exe (process 13232) exited with code -1073741819 (0xc0000005).
Press any key to close this window . . .
```

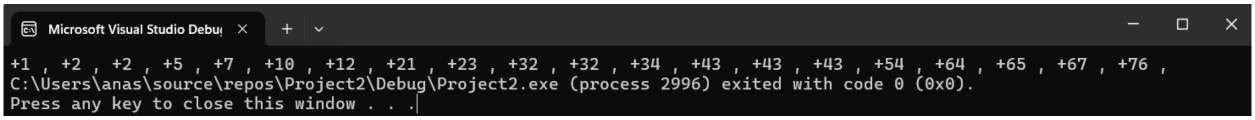
Q5

Code:

```
INCLUDE Irvine32.inc

.data
```

```
arr DWORD 2, 5, 7, 1, 10, 34, 54, 43, 2, 32, 21, 43, 65, 76, 43, 32, 23, 12, 67, 64
str1 BYTE " , ", 0

.code
main PROC
push offset arr

call BubbleSort
; Printing array
mov ecx, LENGTHOF arr
mov esi, 0

L3:
mov eax, arr[esi*4]
call Writeint
mov edx, offset str1
call Writestring
inc esi
loop L3

exit
main ENDP

BubbleSort PROC
push ebp
mov ebp, esp
pushad

mov ecx, LENGTHOF arr
dec ecx

;Outer loop
L1:
push ecx
mov esi, 0
mov ebx, ecx

;Inner loop
L2:
mov eax, arr[esi*4] ; Load the first element of the arr into eax
mov edx, arr[esi*4+4]  ; Load the next element into edx
cmp eax, edx
jle skipSwap

;Swap elements
mov arr[esi*4], edx ; Store edx into arr[esi]
mov arr[esi*4+4], eax

skipSwap:
inc esi
dec ebx
jnz L2

pop ecx ; Restore outer loop counter
dec ecx
jnz L1

done:
popad
```

```
pop ebp
ret
BubbleSort ENDP

END main
```



```
+1 , +2 , +2 , +5 , +7 , +10 , +12 , +21 , +23 , +32 , +32 , +34 , +43 , +43 , +43 , +54 , +64 , +65 , +67 , +76 ,
C:\Users\anas\source\repos\Project2\Debug\Project2.exe (process 2996) exited with code 0 (0x0).
Press any key to close this window . . .
```