

# TASK 1:

```
TITLE Array Sum Q1

include Irvine32.inc

include macros.inc

.data

array sdword -30,45,11,90,-87,66,18

j dword ?

k dword ?

sum1 dword ?

sum2 dword ?

.code

main proc

    xor eax,eax

    xor ebx,ebx

    xor ecx,ecx

    xor edx,edx

    mwrite "Elements of array are: "

    call crlf

    mov ecx,lengthof array

    mov esi,0

L3:

    mov eax,array[esi]

    call writeint

    mwrite " "

    add esi,4

loop l3

    call crlf

    mwrite "Enter the starting indexed element"

    call readint

    mov j,eax

    mwrite "Enter the ending indexed element"

    call readint
```

```
mov k,eax
push offset array
push lengthof array
push j
push k
call array_sum
mov sum1,eax
add esp,8
xor eax,eax
mwrite "Enter the starting indexed element"
call readint
mov j,eax
mwrite "Enter the ending indexed element"
call readint
mov k,eax
push j
push k
call array_sum
mov sum2,eax
call crlf
mov eax,sum1
mwrite "The sum first time is:"
call crlf
call writeint
call crlf
mwrite"The sum second time is: "
call crlf
mov eax,sum2
call writeint

exit
main endp
```

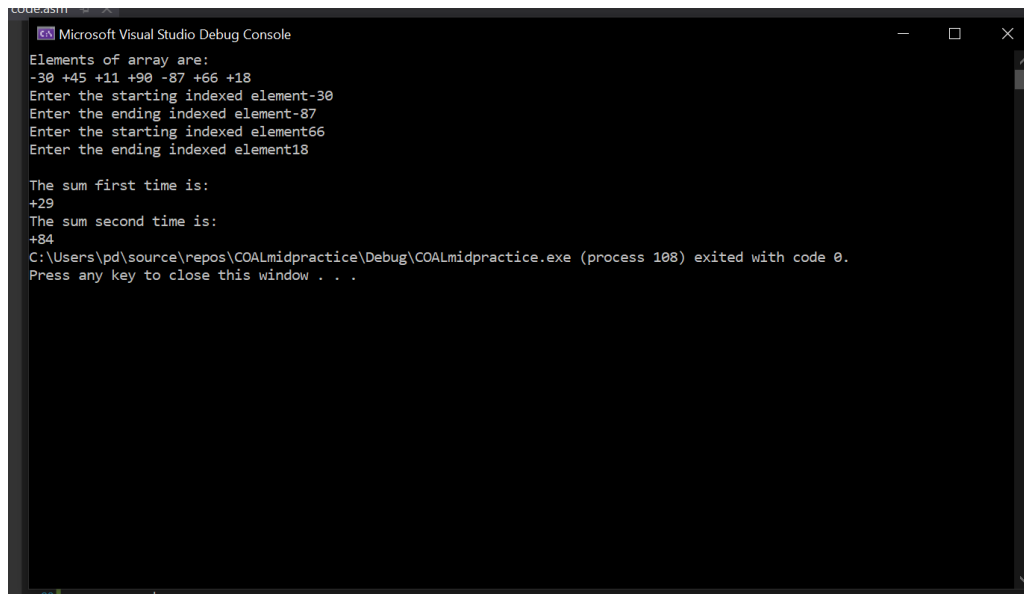
array\_sum proc uses ecx edx ebx esi

```

push ebp
mov ebp,esp
mov ecx,[ebp+32]
mov esi,[ebp+36]
mov ebx,0
mov eax,0
l1:      mov edx,[esi+ebx]
cmp edx,[ebp+28]
je e_found
cmp ecx,0
je en_found
dec ecx
add ebx,4
jmp l1
e_found:
        l2:
                mov edx,[esi+ebx]
                cmp edx,[ebp+24]
                je en_found
                add eax,[esi+ebx]
                add ebx,4
                jmp l2
en_found:
cmp eax,0
jne ret_elem
mwrite "Element not found"
ret_elem:
        add eax,[esi+ebx]
        mov esp,ebp
        pop ebp
        ret
array_sum endp
end main

```

# OUTPUT



The screenshot shows a Windows command prompt window titled "Microsoft Visual Studio Debug Console". The text inside the window is as follows:

```
Elements of array are:  
-30 +45 +11 +90 -87 +66 +18  
Enter the starting indexed element-30  
Enter the ending indexed element-87  
Enter the starting indexed element66  
Enter the ending indexed element18  
  
The sum first time is:  
+29  
The sum second time is:  
+84  
C:\Users\pd\source\repos\COALmidpractice\Debug\COALmidpractice.exe (process 108) exited with code 0.  
Press any key to close this window . . .
```

## TASK 2:

TITLE Insertion sort Q2

include Irvine32.inc

include macros.inc

.data

array dword 60,4,17,45,7

temp dword ?

max dword ?

.code

main proc

xor eax,eax

xor ebx,ebx

xor ecx,ecx

xor edx,edx

mov ecx,lengthof array

outerloop:

    ;mov edi,offset array

    mov edx,offset array

    mov eax,[edx]

    mov max,eax

```

mov temp,ecx
mov esi,offset array
innerloop:
    mov ebx,[esi]
    cmp ebx,max
    jle next
    mov max,ebx
    mov edx,esi          ;edx hold address of max value
    next:
    add esi,4
loop innerloop
; maximum number is obtained
mov ecx,temp
cmp edx,esi
je n_swap
sub esi,4
push esi
push edx
call swap
pop eax
pop eax
xor eax,eax
n_swap:
loop outerloop
mov esi,offset array
mov ebx,0
mov ecx,lengthof array
l1:
    mov eax,[esi+ebx]
    call writedec
    mwrite " "
    add ebx,4
loop l1

exit
main endp

```

```

swap proc

push ebp

mov ebp,esp

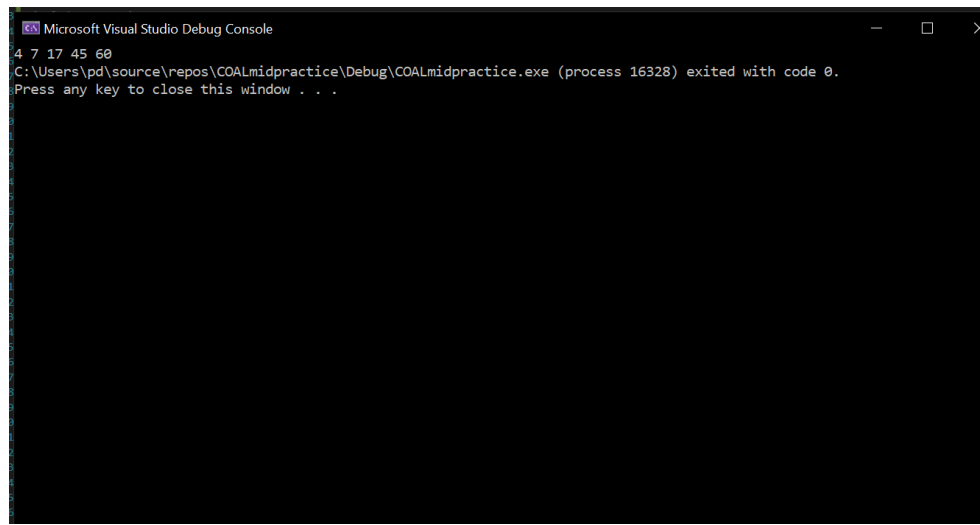
mov esi,[ebp+8]           ;source
mov edi,[esp+12]         ;dest
mov ebx,[esi]
xchg ebx,[edi]
mov [esi],ebx
mov esp,ebp
pop ebp
ret

swap endp

end main

```

## OUTPUT



```

Microsoft Visual Studio Debug Console
4 7 17 45 60
C:\Users\pd\source\repos\COALmidpractice\Debug\COALmidpractice.exe (process 16328) exited with code 0.
Press any key to close this window . . .

```

## TASK 3:

```

include Irvine32.inc

.data

array byte 11,9,45,3,2,7,8,31,99

temp dword ?

```

```

.code

main proc

xor eax,eax

xor ebx,ebx

xor ecx,ecx

xor edx,edx

push offset array

mov ebx,lengthof array

push ebx

call bubblesort

mov ecx,lengthof array

mov esi,offset array

mov eax,0

l1:

    mov al,[esi]

    call writedec

    call crlf

    inc esi

loop l1

exit

main endp

bubblesort proc

push ebp

mov ebp,esp

mov ecx, [ebp+8]

dec ecx

outerloop:

    mov esi,[ebp+12]

    mov temp,ecx

    mov ecx,[ebp+8]

    dec ecx

    innerloop:

        mov dl,[esi]

        mov al,[esi+1]

        cmp dl,al

```

```

        jb n_swap
        xchg dl,al
        mov [esi],dl
        mov [esi+1],al
n_swap:
        inc esi
        loop innerloop

    mov ecx,temp

loop outerloop

mov esp,ebp

pop ebp

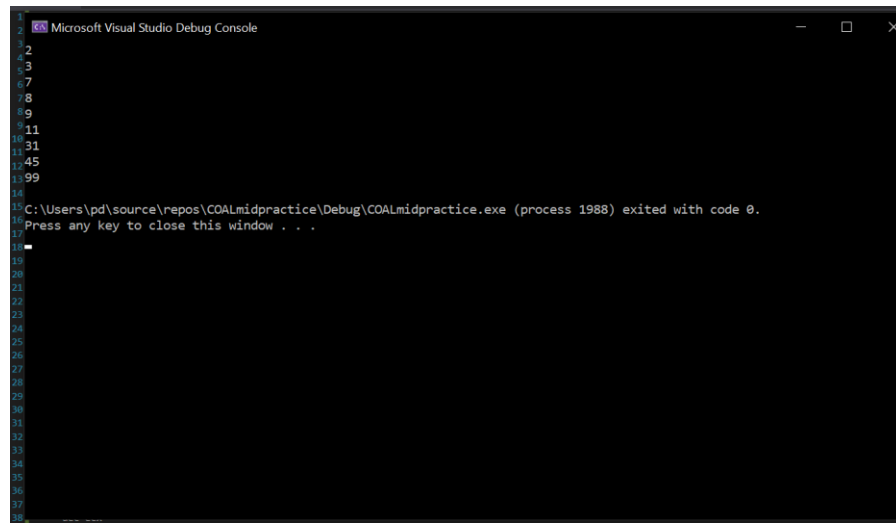
ret 8

bubblesort endp

end main

```

## OUTPUT



```

1
2 Microsoft Visual Studio Debug Console
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15 C:\Users\pd\source\repos\COALmidpractice\Debug\COALmidpractice.exe (process 1988) exited with code 0.
16 Press any key to close this window . . .
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```

## TASK 4:

```

include Irvine32.inc

include macros.inc

.data

n dword ?

.code

main proc

```



```

xor ebx,ebx

mwrite "Enter the number to find factorial "

call readint

cmp eax,1

je cc

cmp eax,0

je cc

mov n,eax

mov ebx,eax

dec ebx

mov ecx,n

call factorial

call writedec

exit

cc:

        mwrite "The factorial is 1"

exit

main endp


factorial proc

        cmp ebx,0

        je end_prog

        imul eax,ebx

        dec ebx

        call factorial

end_prog:

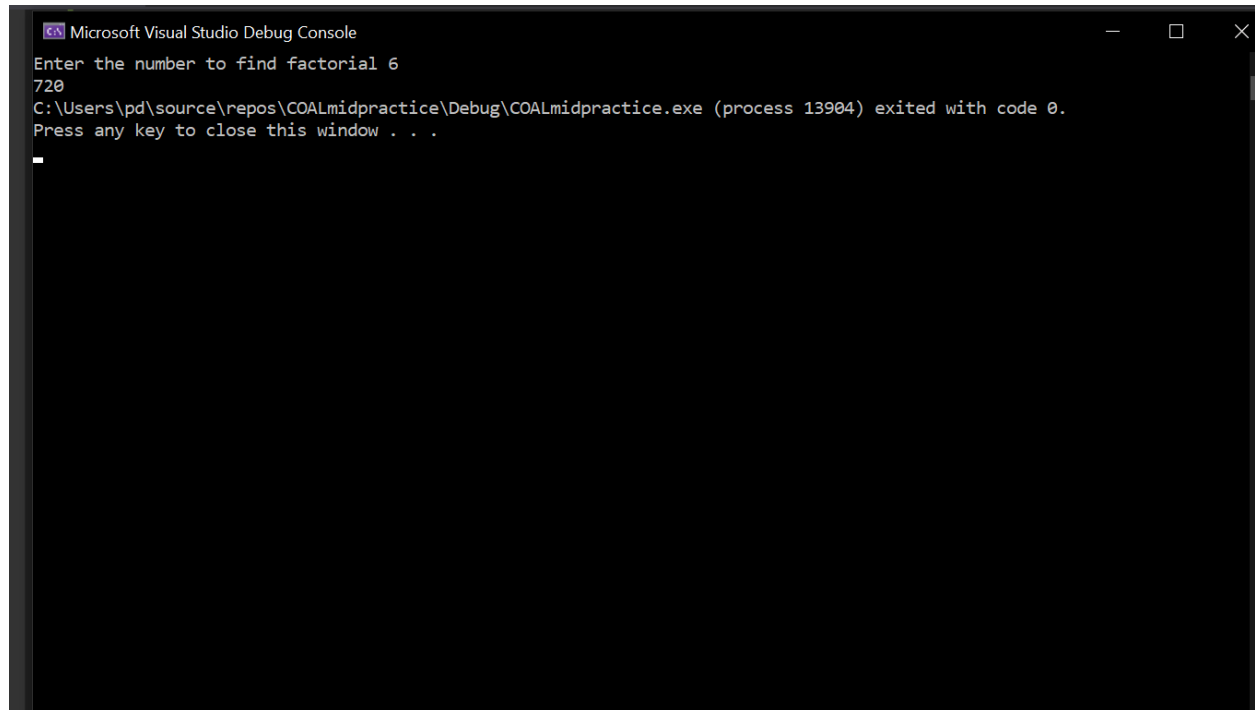
ret

factorial endp

end main

```

## OUTPUT:

A screenshot of the Microsoft Visual Studio Debug Console window. The window has a title bar with the text "Microsoft Visual Studio Debug Console" and standard window controls (minimize, maximize, close). The console output is as follows:

```
Enter the number to find factorial 6
720
C:\Users\pd\source\repos\COALmidpractice\Debug\COALmidpractice.exe (process 13904) exited with code 0.
Press any key to close this window . . .
```

## TASK 5:

```
include Irvine32.inc
include macros.inc

.data

input byte ?

count byte 0

.code

main proc

xor eax, eax

mwrite "Enter a character "

mov edx, offset input

mov ecx, 2

call readstring

mov al, input[0]

mov ecx, 8

clc

ll:
```

```

        shr al,1

        jnc cont

        inc count

cont:

loop 11

mov al,input[0]

call writebin

call crlf

mwrite "The number of 1's are: "

mov al,count

call writedec

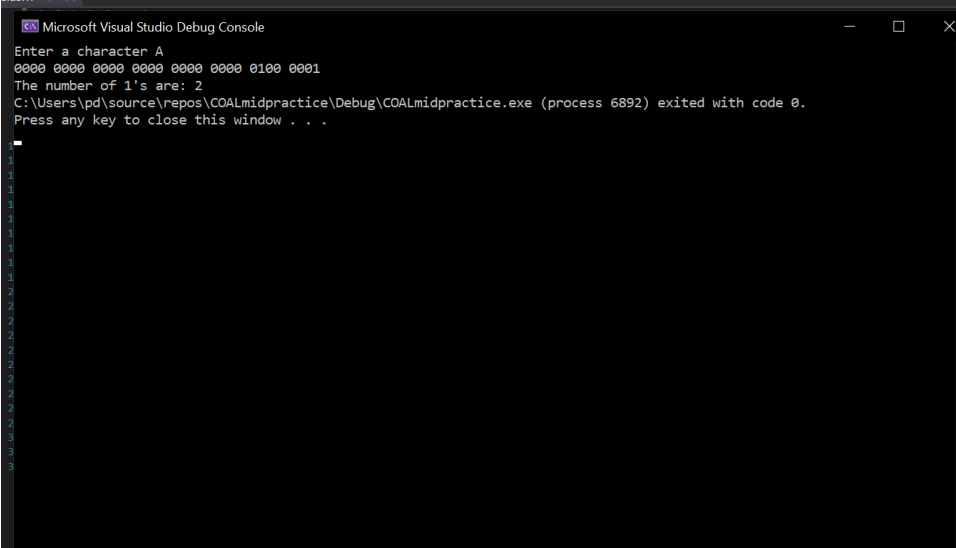
exit

main endp

end main

```

## OUTPUT



```

Microsoft Visual Studio Debug Console
Enter a character A
0000 0000 0000 0000 0000 0000 0100 0001
The number of 1's are: 2
C:\Users\pd\source\repos\COALmidpractice\Debug\COALmidpractice.exe (process 6892) exited with code 0.
Press any key to close this window . . .

```

## TASK 6:

```

include Irvine32.inc

include macros.inc

.data

array1 dword 3,1,5,7,8,11,9

array2 dword 1,5,6,10,13,11,9

```

```

temp dword ?
count dword ?

countmatches proto ,ptr1:ptr dword,ptr2:ptr dword,len:dword

.code

main proc

xor eax,eax

invoke countmatches,addr array1,addr array2, lengthof array1

mwrite "Number of same elements are: "

call crlf

call writedec


exit

main endp


countmatches proc uses esi edi ecx ebx edx ,ptr1:ptr dword,
                                ptr2:ptr dword,
                                len:dword

mov esi,ptr1
mov edi,ptr2
mov ecx,len
;mov ebx,0
outerloop:
    mov ebx,0
    mov temp,ecx
    mov ecx,len
    innerloop:
        mov edx,[esi]
        cmp edx,[edi+ebx]
        jne cont
        inc eax
    cont:
        add ebx,4
    loop innerloop
    mov ecx,temp
    add esi,4

```

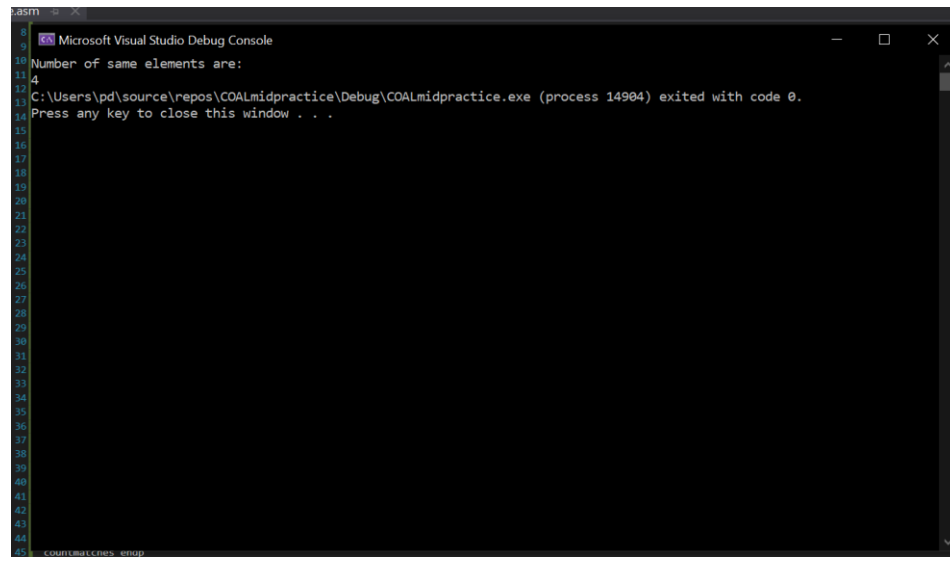
loop outerloop

ret 12

countmatches endp

end main

## OUTPUT:

A screenshot of the Microsoft Visual Studio Debug Console window. The window title is "Microsoft Visual Studio Debug Console". The output text is as follows:

```
10 Number of same elements are:  
11 4  
12 C:\Users\pd\source\repos\COALmidpractice\Debug\COALmidpractice.exe (process 14904) exited with code 0.  
13 Press any key to close this window . . .  
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45 countmatches_endp
```

## TASK 7:

include irvine32.inc

include macros.inc

.data

op1 qword 0A2B2A40674981234h,0BC346AF1A3315891h ;16 bytes number

op2 qword 08010870000234502h,213D45FA11A36531h ;16 bytes number

sum dword 5 dup(?)

.code

main proc

mov esi, offset op1

mov edi, offset op2

mov ebx, offset sum

mov ecx,4

call extended\_add

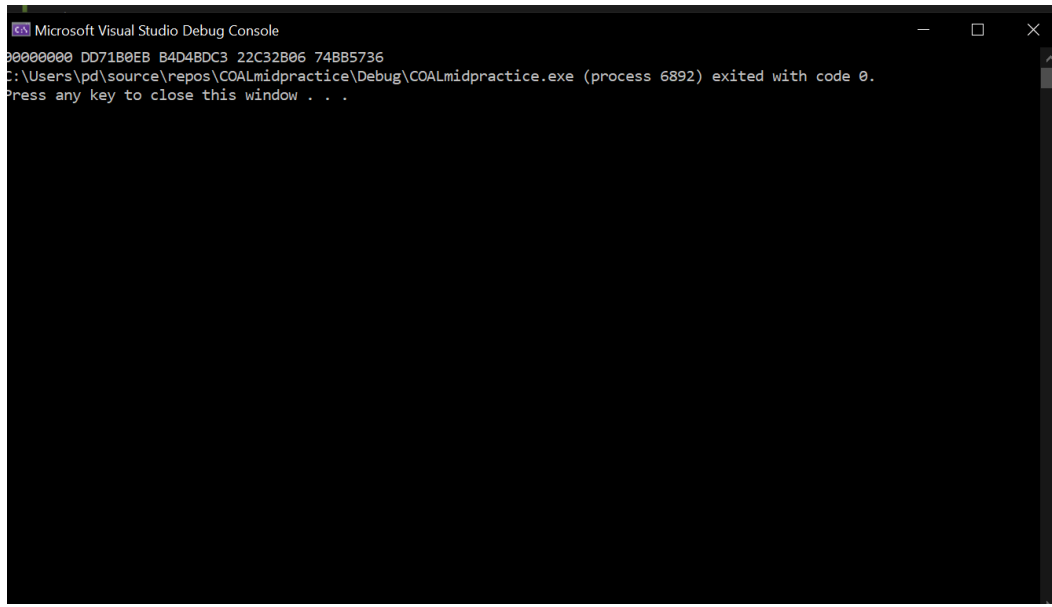
mov ebx,offset sum

```
mov ecx,lengthof sum
mov edx,sizeof sum
sub edx,4
l1:
mov eax, [ebx+edx]
call writehex
mwrite " "
sub edx,4
loop l1
exit
main endp
```

```
extended_add proc
pushad
clc
l1:
    mov eax,[esi]
    adc eax,[edi]
    mov [ebx],eax
    pushfd
    add esi,4
    add edi,4
    add ebx,4
    popfd
loop l1
popad
adc word ptr [ebx],0
ret
```

```
extended_add endp
end main
```

# OUTPUT:



## TASK 8:

```
include Irvine32.inc
include macros.inc

.data

op1 qword 0F1A2A40674781134h,0BA346AD1A3335851h    ;16 bytes number
op2 qword 03010830000234502h,213D45FA11A36531h    ;16 bytes number
diff dword 5 dup(?)

.code

main proc
    mov esi, offset op1
    mov edi, offset op2
    mov ebx, offset diff
    mov ecx,4
    call extended_sub
    mov ebx,offset diff
    mov ecx,lengthof diff
    mov edx,sizeof diff
    sub edx,4
ll:
```

```
mov eax, [ebx+edx]
```

```
call writehex
```

```
mwrite " "
```

```
sub edx,4
```

```
loop l1
```

```
exit
```

```
main endp
```

```
extended_sub proc
```

```
pushad
```

```
clc
```

```
l1:
```

```
    mov eax,[esi]
```

```
    sbb eax,[edi]
```

```
    mov [ebx],eax
```

```
    pushfd
```

```
    add esi,4
```

```
    add edi,4
```

```
    add ebx,4
```

```
    popfd
```

```
loop l1
```

```
popad
```

```
sbb word ptr [ebx],0
```

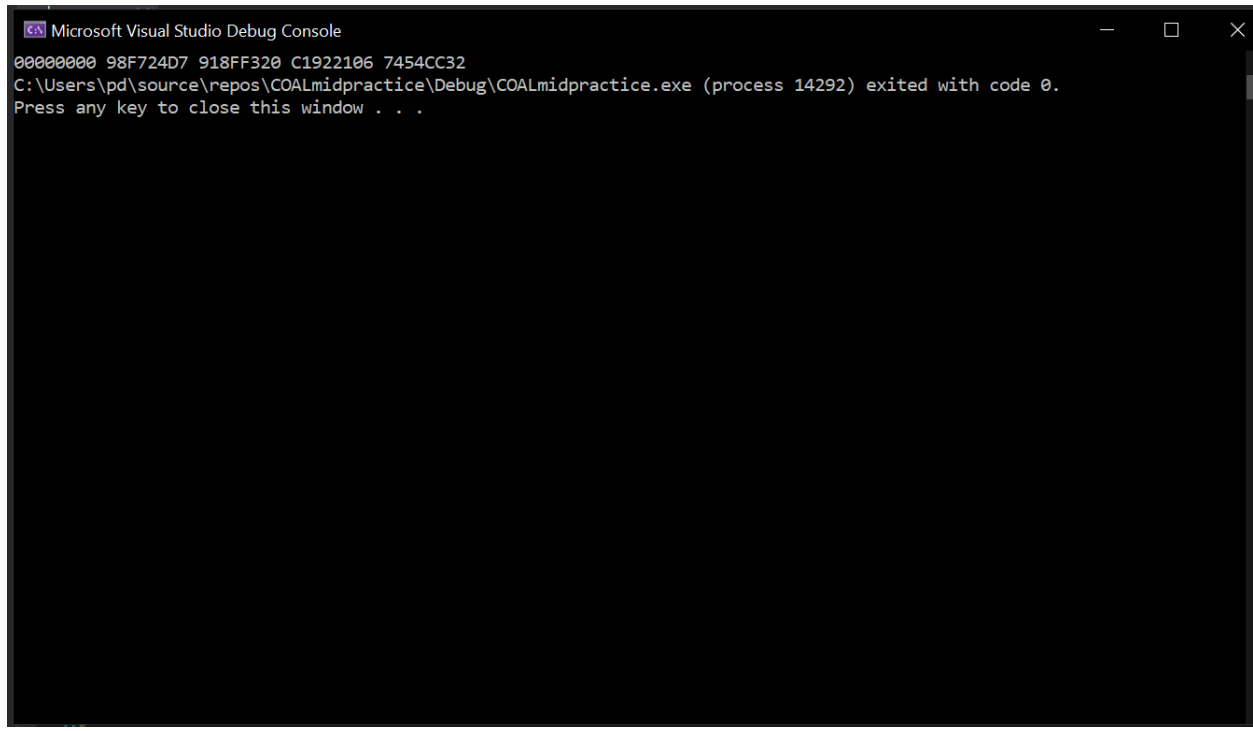
```
ret
```

```
extended_sub endp
```

```
end main
```



# OUTPUT:

A screenshot of the Microsoft Visual Studio Debug Console window. The window has a title bar with the Visual Studio icon and the text "Microsoft Visual Studio Debug Console". The console output shows several lines of memory addresses in hexadecimal: "00000000 98F724D7 918FF320 C1922106 7454CC32". Below these, it says "C:\Users\pd\source\repos\COALmidpractice\Debug\COALmidpractice.exe (process 14292) exited with code 0." and "Press any key to close this window . . .". The background of the console is black, and the text is white.

```
Microsoft Visual Studio Debug Console
00000000 98F724D7 918FF320 C1922106 7454CC32
C:\Users\pd\source\repos\COALmidpractice\Debug\COALmidpractice.exe (process 14292) exited with code 0.
Press any key to close this window . . .
```

# TASK 9:

```
include irvine32.inc

include macros.inc

.data

a dword ?

b dword ?

find_gcd proto, val1:dword, val2:dword

.code

main proc

xor eax, eax

mov ecx, 3

ll:

    mwrite "Enter two numbers to find GCD: "

    call readint

    mov a, eax

    call readint

    mov b, eax

    invoke find_gcd, a, b
```

```
        call crlf
        mwrite "The GCD is: "
        call crlf
        call writedec
        call crlf

loop11:
exit:
main endp
```

```
find_gcd proc, val1:dword, val2:dword
```

```
    cmp val1, 0
    je rval2
    cmp val2, 0
    je rval1
    mov ebx, val1
    mov edx, val2
    cmp ebx, edx
    je rval1
    cmp ebx, edx
    jb cont
    sub ebx, edx
    mov val1, ebx
    invoke find_gcd, val1, val2
    ret

cont:
    sub edx, ebx
    mov val2, edx
    invoke find_gcd, val1, val2
    ret

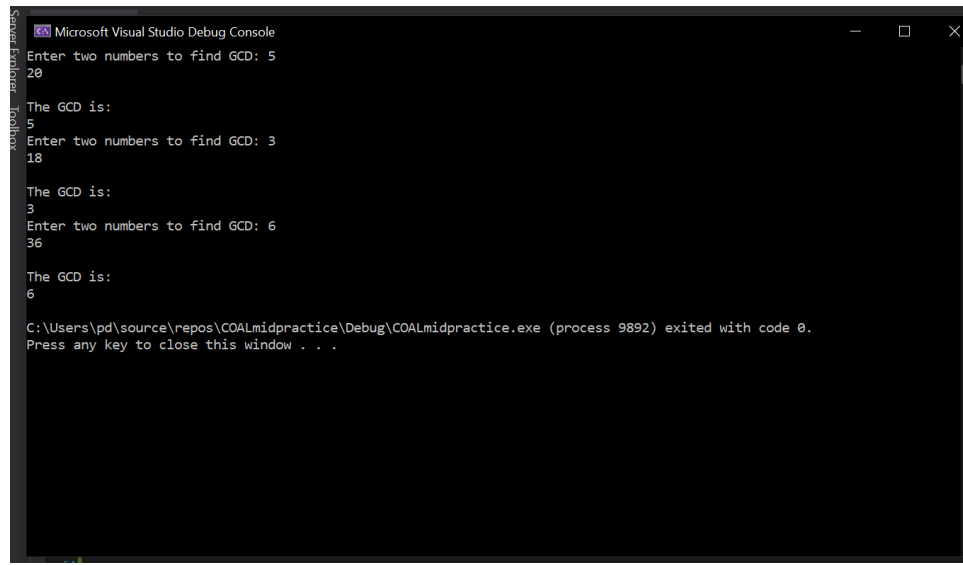
rval1:
    mov eax, ebx
    ret

rval2:
    mov eax, edx
    ret
```

```
find_gcd endp
```

```
end main
```

## OUTPUT:



The screenshot shows the Microsoft Visual Studio Debug Console with a black background and white text. The text displays the execution of a program that calculates the Greatest Common Divisor (GCD) for three pairs of numbers. The first pair is 5 and 20, resulting in a GCD of 5. The second pair is 3 and 18, resulting in a GCD of 3. The third pair is 6 and 36, resulting in a GCD of 6. The console also shows the program's exit message and a prompt to press any key to close the window.

```
Microsoft Visual Studio Debug Console
Enter two numbers to find GCD: 5
20
The GCD is:
5
Enter two numbers to find GCD: 3
18
The GCD is:
3
Enter two numbers to find GCD: 6
36
The GCD is:
6
C:\Users\pd\source\repos\COALmidpractice\Debug\COALmidpractice.exe (process 9892) exited with code 0.
Press any key to close this window . . .
```

## TASK 10:

```
include Irvine32.inc
```

```
include macros.inc
```

```
.data
```

```
array1 dword 9,15,11,6,33,19,2
```

```
array2 dword 1,5,6,10,13,11,9
```

```
temp dword ?
```

```
differ dword ?
```

```
countnearmatches proto ,ptr1:ptr dword,ptr2:ptr dword,len:dword,diff:dword
```

```
.code
```

```
main proc
```

```
xor eax,eax
```

```
mov differ,3
```

```
invoke countnearmatches,addr array1,addr array2,lengthof array1,differ
```

```
mwrite "Number of elements whose difference is greater than 3 are: "
```

```
call crlf
```

```
call writedec
```

exit

main endp

countnearthmatches proc uses esi edi ecx ,ptr1:ptr dword,

ptr2:ptr dword,

len:dword,

diff:dword

mov esi,ptr1

mov edi,ptr2

mov ecx,len

;mov ebx,0

outerloop:

mov edx,[esi]

sub edx,[edi] ;array1[i] - array2[i]

cmp edx,diff

jg cont

inc eax

cont:

add esi,4

add edi,4

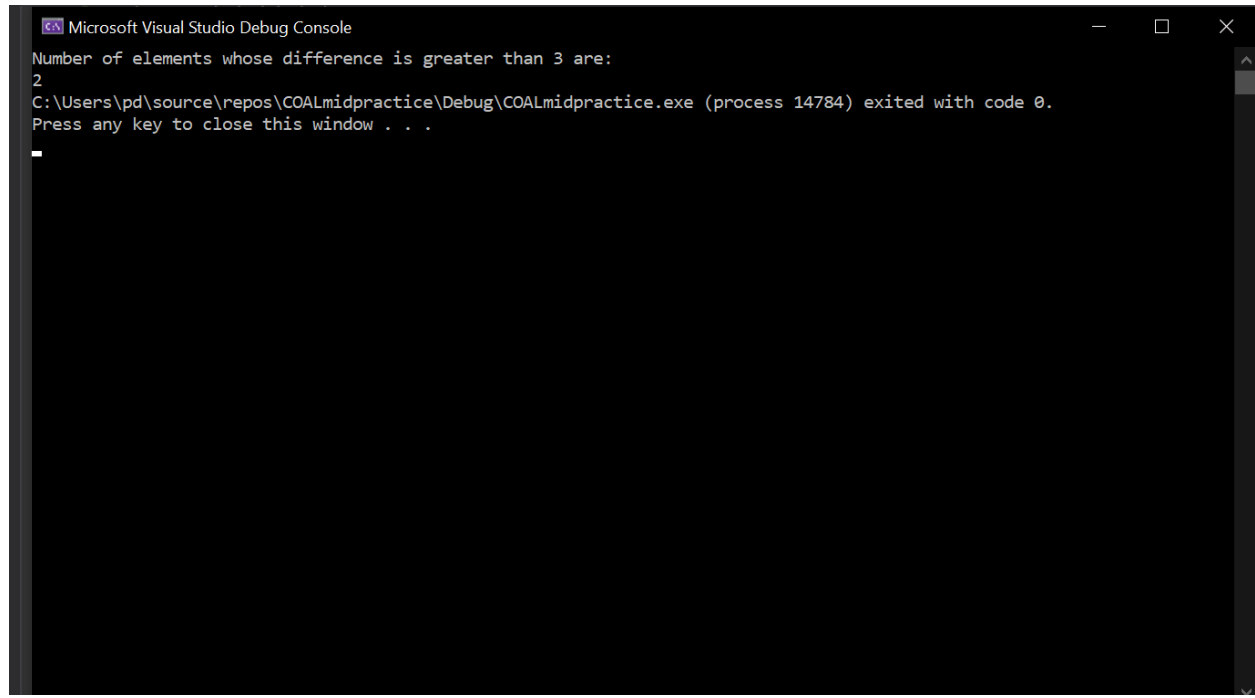
loop outerloop

ret

countnearthmatches endp

end main

# OUTPUT:

A screenshot of the Microsoft Visual Studio Debug Console window. The window has a title bar with the text "Microsoft Visual Studio Debug Console" and standard minimize, maximize, and close buttons. The console area is black with white text. The output shows the number of elements whose difference is greater than 3, which is 2. It also shows the program path and exit code, and a prompt to press any key to close the window.

```
Microsoft Visual Studio Debug Console
Number of elements whose difference is greater than 3 are:
2
C:\Users\pd\source\repos\COALmidpractice\Debug\COALmidpractice.exe (process 14784) exited with code 0.
Press any key to close this window . . .
```