
# ARYABHATTA COLLEGE

COMPUTER SCIENCE DEPARTMENT

COURSE : B. Sc. (h) Computer Science

NAME : MUSKAN SAINI

YEAR: III

SEMESTER: V

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PROFESSOR: DR. SONAL LINDA

# Micro Processor Practical FILE

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# Q1.Write a program for 32-bit binary

## (i)Addition (ii) Subtraction (iii) division and (iv) Multiplication

CODE

```
;32 bit binary addition
.model small
.386
.data
num1 DD 00000000H
num2 DD 00000000H
num3 DD 00000000H
msg db 10,13,"Enter the first no.:: $"
msg1 db 10,13,"Enter the second no.:: $"
msg2 db 10,13,"The Resultant sum is :: $"
.code
.startup
MOV AH,09
MOV DX,OFFSET msg
INT 21H
MOV EBX,0
MOV CX,8
AGAIN: MOV AH,01 ;1ST NO. ENTERED
INT 21H
```

```
CMP AL,'A'
JGE L2
SUB AL,30H
SHL EBX,4
ADD BL,AL
LOOP AGAIN
MOV num1,EBX
MOV AH,09
MOV DX,OFFSET msg1
INT 21H

MOV EBX,0
MOV CX,8
AGAIN1:MOV AH,01 ;2nd NO. ENTERED
INT 21H
CMP AL,'A'
JGE L2
SUB AL,30H
SHL EBX,4
ADD BL,AL
LOOP AGAIN1
MOV num2, EBX
```

```
mov ax, word ptr num1
mov dx, word ptr num2
add al,dl
daa
mov bl,al
mov al,ah
adc al,dh
daa
mov bh,al
mov word ptr num3, bx
mov ax, word ptr num1+2
mov dx, word ptr num2+2
adc al,dl
daa
mov bl,al
mov al,ah
adc al,dh
daa
mov bh,al
mov word ptr num3+2,bx
mov ebx,num3
mov ah, 09h
```

```
mov dx, offset msg2

int 21h

jnc 16

mov ah, 02h

mov dl, "1"

int 21h

16: MOV CX,8

AGAIN2: ROL EBX,4

MOV DL,BL

AND DL,0FH

ADD DL,30H

MOV AH,02

INT 21H

LOOP AGAIN2

L2: .EXIT

END
```

# output

```
Z:\>c:

C:\>cd tasm

C:\TASM>tasm bcdsub.asm
Turbo Assembler  Version 3.0  Copyright (c) 1988, 1991 Borland International

Assembling file:   bcdsub.asm
Error messages:    None
Warning messages:  None
Passes:            1
Remaining memory:  474k


C:\TASM>tlink bcdsub.obj
Turbo Link  Version 2.0  Copyright (c) 1987, 1988 Borland International
Warning: no stack

C:\TASM>bcdsub.exe

Enter the first no.:: 11223344
Enter the second no.:: 11112222
The Resultant sum is :: 22335566
C:\TASM>
```

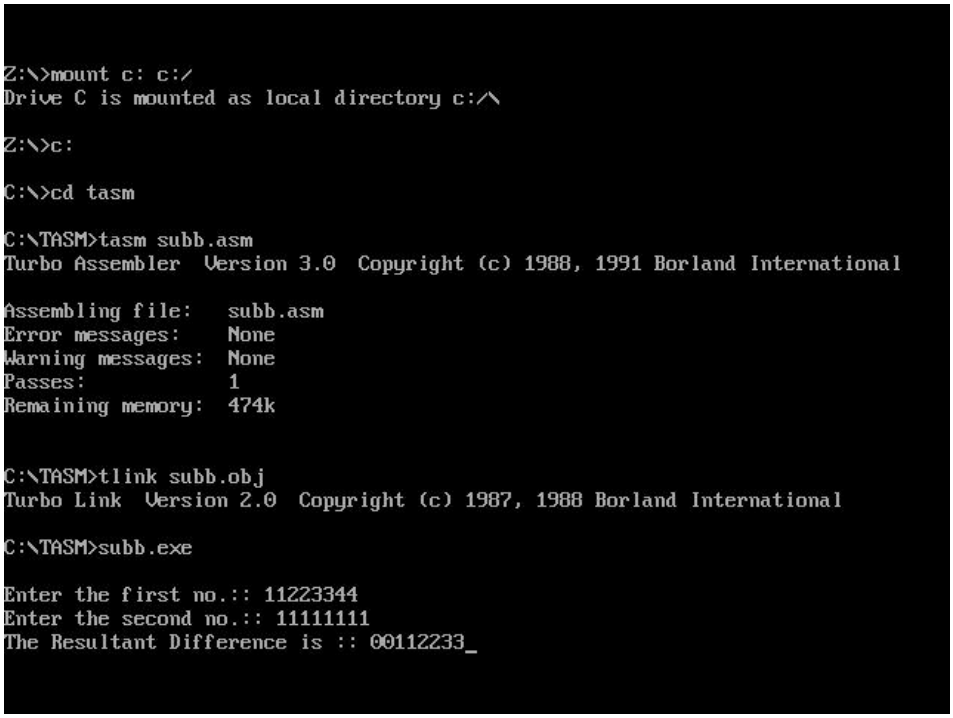
## Code:

```
;32 bit binary subtraction

.model small

.386

.stack 100h
.data
num1 DD 00000000H
num2 DD 00000000H
num3 DD 00000000H
msg db 10,13,"Enter the first no.:: $"
msg1 db 10,13,"Enter the second no.:: $"
msg2 db 10,13,"The Resultant Difference is :: $"

.code
.startup

MOV AH,09
MOV DX,OFFSET msg
INT 21H

MOV EBX,0
MOV CX,8

AGAIN: MOV AH,01 ;1ST NO. ENTERED
INT 21H
CMP AL,'A'
JGE L2
SUB AL,30H
SHL EBX,4
ADD BL,AL
LOOP AGAIN

MOV num1,EBX

MOV AH,09
```

```
MOV DX,OFFSET msg1
INT 21H

MOV EBX,0
MOV CX,8
AGAIN1:MOV AH,01 ;2nd NO. ENTERED
INT 21H
CMP AL,'A'
JGE L2
SUB AL,30H
SHL EBX,4
ADD BL,AL
LOOP AGAIN1

MOV num2, EBX

mov ah, 09h
mov dx, offset msg2
int 21h

mov ax, word ptr num1+2
mov dx, word ptr num2+2
sub al,dl
das
mov dl,al
sbb ah,dh
das
mov dh,al
call disph

mov ax, word ptr num1
mov dx, word ptr num2
sub al,dl
das
mov dl,al
sbb ah,dh
das
mov dh,al
```

```
disph proc near
mov cl,4
mov ch,4
disph1:
rol ax,cl
push ax
and al,0fh
add al,30h
cmp al,'9'
jbe disph2
add al,7
disph2:
mov ah,2
mov dl,al
int 21h
pop ax
dec ch
jne disph1
ret
disph endp
.EXIT
L2:
.EXIT
END
```

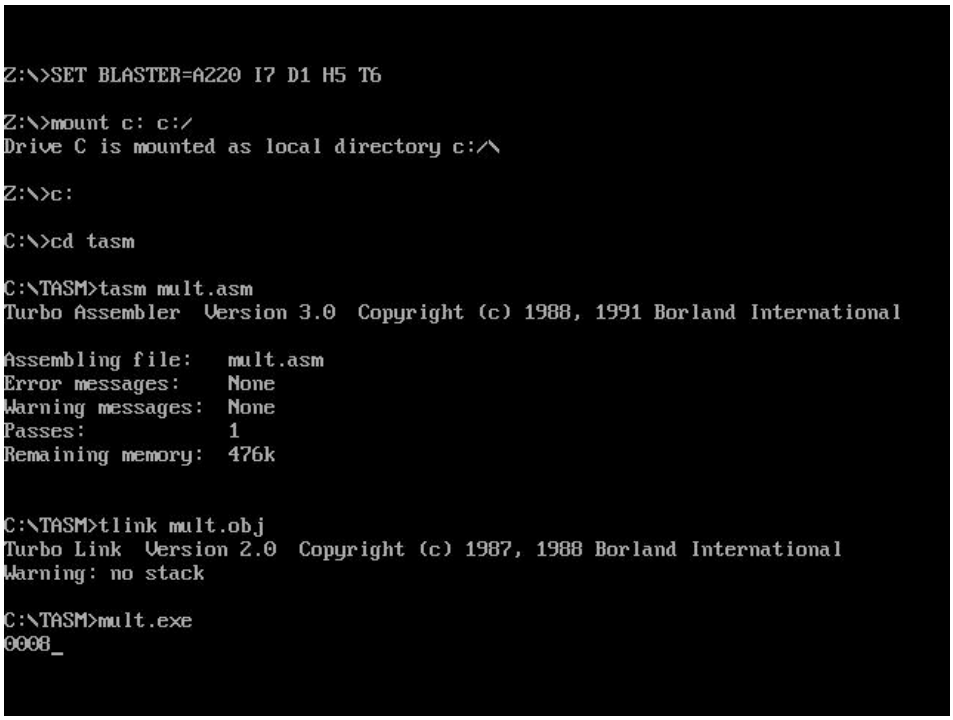
# output


Z:\>mount c: c:/
Drive C is mounted as local directory c:/\
Z:\>c:
C:\>cd tasm
C:\TASM>tasm subb.asm
Turbo Assembler Version 3.0 Copyright (c) 1988, 1991 Borland International
Assembling file: subb.asm
Error messages: None
Warning messages: None
Passes: 1
Remaining memory: 474k
C:\TASM>tlink subb.obj
Turbo Link Version 2.0 Copyright (c) 1987, 1988 Borland International
C:\TASM>subb.exe
Enter the first no.:: 11223344
Enter the second no.:: 11111111
The Resultant Difference is :: 00112233_

Code:

```
;32bit binary multiplication
.model tiny
.code

mov ax,04H
mov bx,02H

mul bl

DISP PROC

PUSH CX
MOV CL, 4
MOv CH, 4

D1:
  ROL AX, CL
  PUSH AX
  AND AL, 0FH
  ADD AL , 30H
  CMP AL, '9'

  JBE D2
  ADD AL , 7H

D2:
  MOV AH, 02H
  MOV DL, AL
  INT 21H
  POP AX
  DEC CH
  JNZ D1
  POP CX
  RET
  DISP ENDP
.exit
End
```

# Output

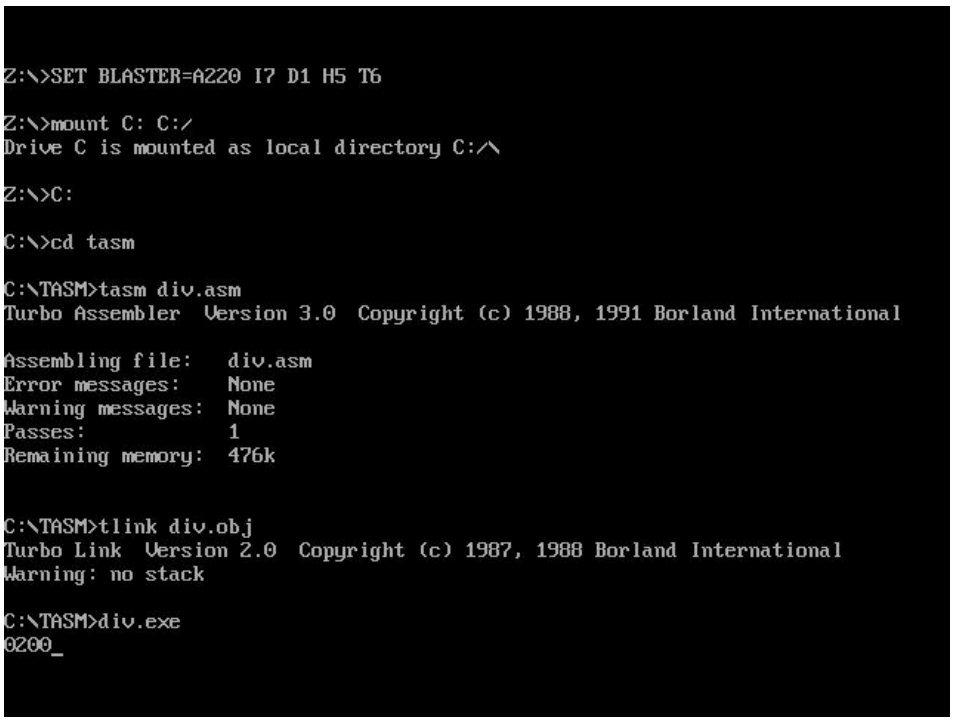

Z:\>SET BLASTER=A220 I7 D1 H5 T6
Z:\>mount c: c:/
Drive C is mounted as local directory c:/\
Z:\>c:
C:\>cd tasm
C:\TASM>tasm mult.asm
Turbo Assembler Version 3.0 Copyright (c) 1988, 1991 Borland International
Assembling file: mult.asm
Error messages: None
Warning messages: None
Passes: 1
Remaining memory: 476k
C:\TASM>tlink mult.obj
Turbo Link Version 2.0 Copyright (c) 1987, 1988 Borland International
Warning: no stack
C:\TASM>mult.exe
0008_

CODE:

```
;32bit binary division
.model tiny
.code

mov ax,02H
mov bx,04H

div bl

DISP PROC

PUSH CX
MOV CL, 4
MOv CH, 4

D1:
  ROL AX, CL
  PUSH AX
  AND AL, 0FH
  ADD AL , 30H
  CMP AL, '9'

  JBE D2
  ADD AL , 7H

D2:
  MOV AH, 02H
  MOV DL, AL
  INT 21H
  POP AX
  DEC CH
  JNZ D1
  POP CX
  RET
  DISP ENDP
```

```
.exit
End
```

# output



## Q2.Write a program for 32-bit BCD (i)Addition and (ii) Subtraction

Code:

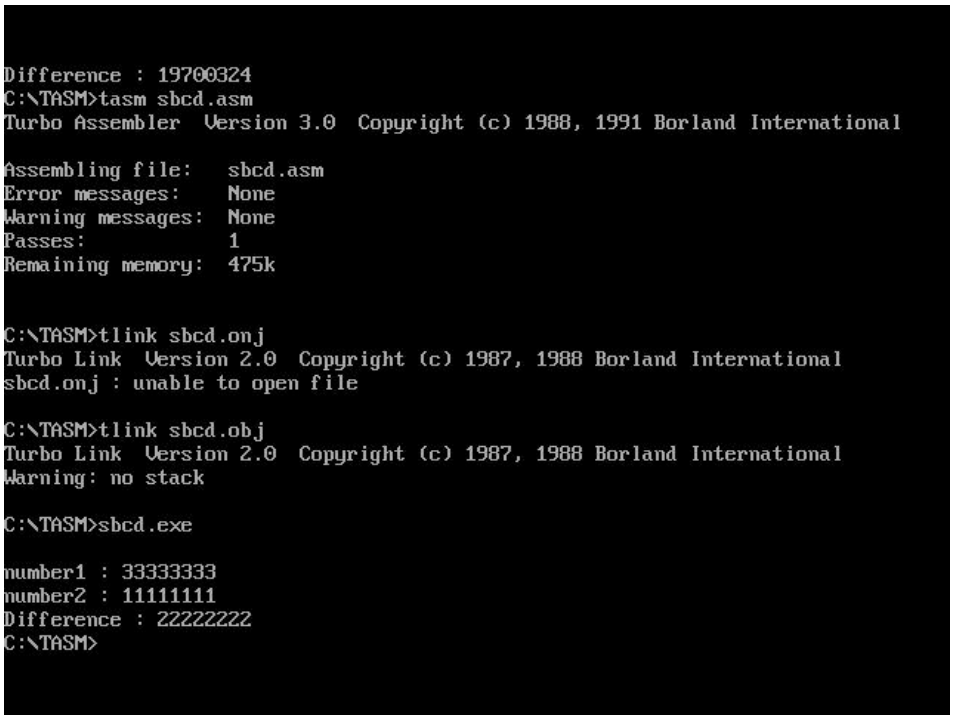
```
;32bit bcd subtraction

.model small

.data

num1 db 10,"number1 : $"

num2 db 10,"number2 : $"

diff db 10,"Difference : $"

.code

.startup

mov dx , offset num1

mov ah, 9h

int 21h

mov ax,3333h

call disph

mov ax,3333h

call disph

mov dx,offset num2

mov ah,9h

int 21h

mov ax,1111h
```

```
call disph
mov ax,1111h
call disph
call sub_num
.exit



sub_num proc near
mov dx,1111h
mov bx,3333h
mov cx,1111h
mov ax,3333h
sub al,cl
das
mov cl,al
sbb ah,ch
mov al,ah
das
mov ch,al
mov si,cx
mov al,bl
sbb al,dl
```

```
das
mov bl,al
mov al,bh
sbb al,dh
das
mov bh,al
mov dx,offset diff
mov ah,9h
int 21h
mov ax,si
call disph
mov ax,bx
call disph

ret
sub_num endp



disph proc near
mov cl,4
mov ch,4
disph1:
```

```
rol ax,cl
push ax
and al,0fh
add al,30h
cmp al,'9'
jbe disph2
add al,7
disph2:
mov ah,2
mov dl,al
int 21h
pop ax
dec ch
jne disph1
ret
disph endp
End
```

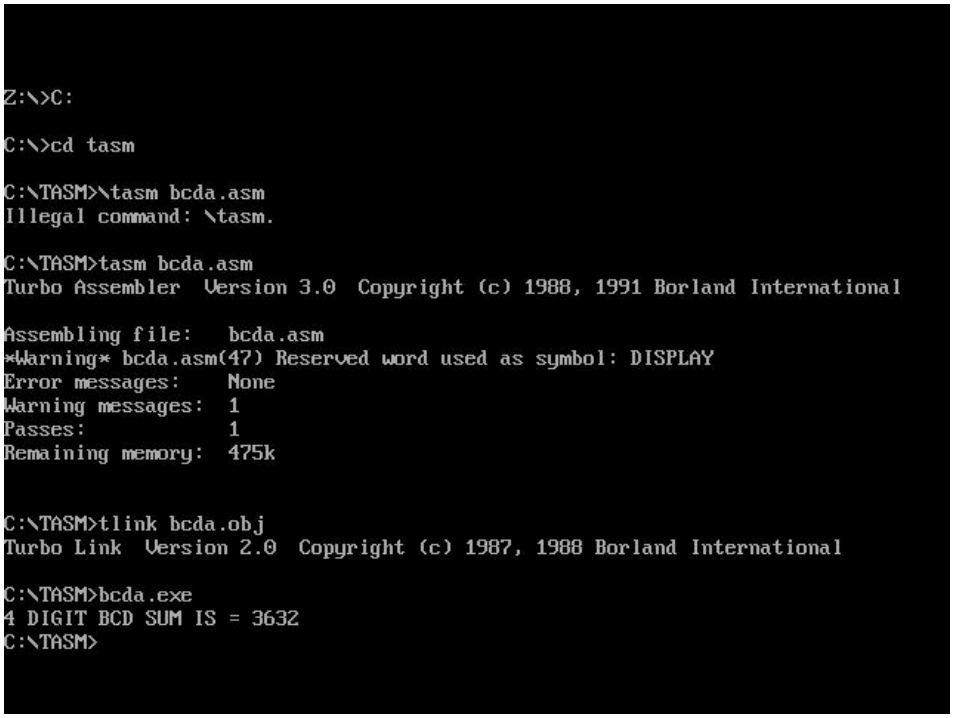
# output


Difference : 19700324
C:\TASM>tasm sbcd.asm
Turbo Assembler Version 3.0 Copyright (c) 1988, 1991 Borland International
Assembling file: sbcd.asm
Error messages: None
Warning messages: None
Passes: 1
Remaining memory: 475k
C:\TASM>tlink sbcd.onj
Turbo Link Version 2.0 Copyright (c) 1987, 1988 Borland International
sbcd.onj : unable to open file
C:\TASM>tlink sbcd.obj
Turbo Link Version 2.0 Copyright (c) 1987, 1988 Borland International
Warning: no stack
C:\TASM>sbcd.exe
number1 : 33333333
number2 : 11111111
Difference : 22222222
C:\TASM>

## Code:

```
;32bit bcd additon
.MODEL SMALL ;assembler memory model
.STACK 100H
.DATA
MSG1 DB "4 DIGIT BCD SUM IS = $"
BCDSUML DB ?
BCDSUMH DB ?
.CODE
MOV AX,@DATA
MOV DS,AX
XOR AX, AX ; clear register AX
MOV AL,34H
MOV BL, 98H
ADD AL,BL
DAA; DECIMAL ADJUST AFTER ADDITION
MOV BCDSUML, AL
MOV AL,12H
MOV BL, 23H
ADC AL,BL
DAA; OPERATES ONLY ON AL
MOV BCDSUMH,AL
MOV AH,BCDSUMH
MOV AL,BCDSUML
PUSH AX
Page 19 of 43MOV DX, OFFSET MSG1
MOV AH, 09H
INT 21H ; INT STANDS FOR INTERRUPT INSTRUCTION 21H IS
INTERRUPT NO FOR DOS SERVICES
POP AX
CALL DISPLAY
MOV AH, 4CH
INT 21H
DISPLAY PROC NEAR ; PROC IS KEYWORD FOR PROCEDURE
MOV CH, 04H
MOV CL, 04H
DISP1:
ROL AX, CL ; ROTATE LEFT 4 TIMES
```

```
PUSH AX ; SAVING ON STACK
AND AL, 0FH
ADD AL, 30H ; 48 IN DECIMAL
CMP AL, '9' ; COMPARE WITH ASCII VALUE OF 9
JBE DISP2
ADD AL, 7
DISP2: MOV DL, AL
MOV AH, 02H
INT 21H
POP AX
DEC CH
JNZ DISP1
RET
DISPLAY ENDP
END
```



## Q.3Write a program for Sorting?

Code:

```
;sorting

.model small

.386

.data

ARRAY DW 20 DUP (?)

DATA1 dw 0000H

NUMB DW 0000H

msg db 10,13,"Enter the size of the array :: $"

msg2 db 10,13,"Enter the array :: $"

msg3 db 10,13,"The sorted array is :: $"
```

```
.code
.startup
MOV AH,09
MOV DX,OFFSET msg
INT 21H
MOV AH,01
INT 21H
SUB AL,30H
MOV AH,0
MOV CX,AX
MOV DATA1,AX

MOV AH,09
MOV DX,OFFSET msg2
INT 21H
MOV AH,0
MOV SI, 0
MOV BX, OFFSET ARRAY
L1: MOV DL, 0AH ; jump onto next line
MOV AH, 02H
INT 21H
MOV DX, SI ; input element of the array
```

```
MOV AH, 01H
INT 21H
SUB AL,30H
MOV SI, DX
MOV [BX + SI], AX
INC SI
LOOP L1

MOV CX, DATA1
MOV BX, OFFSET ARRAY
MOV DI,CX
L2: MOV CX, DATA1
MOV NUMB, CX      ; Change1
DEC NUMB          ; Change2
MOV CX, NUMB      ; change3
MOV SI, 0
L3: MOV AL, [BX + SI]
CMP AL, [BX + SI + 1]
JL L4
XCHG AL,[BX + SI + 1]
MOV [BX + SI],AL
L4: INC SI
```

```
LOOP L3

DEC DI

JNZ L2


MOV CX, DATA1

MOV SI, 0

MOV BX, OFFSET ARRAY

MOV AH,09

MOV DX,OFFSET msg3

INT 21H

L5: MOV DL, 0AH ; jump onto next line

MOV AH, 02H

INT 21H

MOV DX, [BX + SI]

INC SI

ADD DL, 30H

MOV AH, 02

INT 21H

LOOP L5

.EXIT

END
```

# output

```
Assembling file:   sort.asm
Error messages:    None
Warning messages:  None
Passes:            1
Remaining memory:  475k


C:\TASM>tlink sort.obj
Turbo Link  Version 2.0  Copyright (c) 1987, 1988 Borland International
Warning: no stack

C:\TASM>sort.exe

Enter the size of the array :: 4
Enter the array ::
8
3
5
7
The sorted array is ::
3
5
7
8
C:\TASM>_
```

Q4.Write a program for

(i) linear search and (ii) Binary search

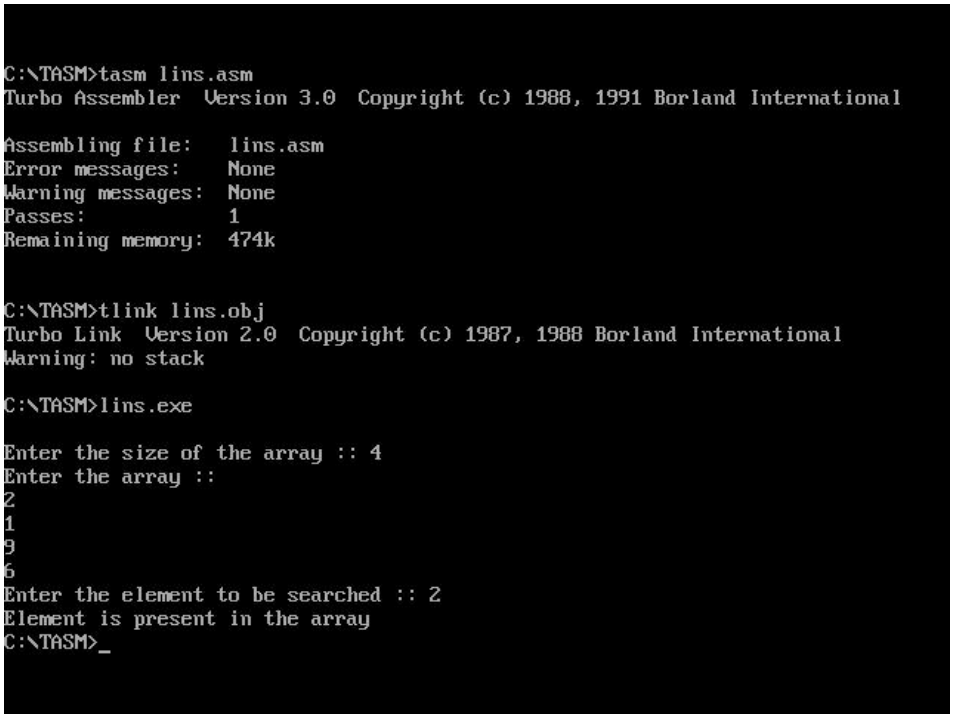
```
;Linear Search
.model small
.386
.data
ARRAY DW 20 DUP (?)
DATA1 dw 0000H
success db 10,13,"Element is present in the array $"
fail db 10,13,"Element is not present in the arary $"
msg db 10,13,"Enter the size of the array :: $"
msg2 db 10,13,"Enter the array :: $"
msg3 db 10,13,"Enter the element to be searched :: $"
.code
.startup
```

```
MOV AH,09
MOV DX,OFFSET msg
INT 21H

MOV AH,01
INT 21H
SUB AL,30H
MOV AH,0
MOV CX,AX

MOV DATA1,AX

MOV AH,09
MOV DX,OFFSET msg2
INT 21H
MOV AH,0
MOV SI, 0
MOV BX, OFFSET ARRAY
L1: MOV DL, 0AH ; jump onto next line
MOV AH, 02H
INT 21H
MOV DX, SI ; input element of the array
```

```
MOV AH, 01H
INT 21H

SUB AL,30H
;MOV SI, DX
MOV [BX + SI], AX
INC SI
LOOP L1

MOV CX,DATA1

MOV AH,09
MOV DX,OFFSET msg3
INT 21H

MOV AH,01 ; Enter element to be searched
INT 21H
SUB AL,30H
MOV SI, 0
MOV BX, OFFSET ARRAY
L2: CMP [BX + SI], AL ; linear search loop
JZ L3 ; jump if element is found
```

```
INC SI
LOOP L2

MOV AH, 09H
MOV DX,OFFSET fail ; if the element is not found
INT 21H
MOV AH, 4CH ; to forcefully terminate the program
INT 21H
L3: MOV AH, 09H
MOV DX,OFFSET success ; if the element is found
INT 21H
MOV AH, 4CH
INT 21H
.EXIT
END
```

# output




# Code:

```
;Binary search

.model small

.386

.data

ARRAY DW 20 DUP (?)

DATA1 dw 0000H

DATA2 dw 0000H

success db 10,13,"Element is present in the array $"

fail db 10,13,"Element is not present in the arary $"

msg db 10,13,"Enter the size of the array :: $"

msg2 db 10,13,"Enter the array :: $"

msg3 db 10,13,"Enter the element to be searched :: $"
```

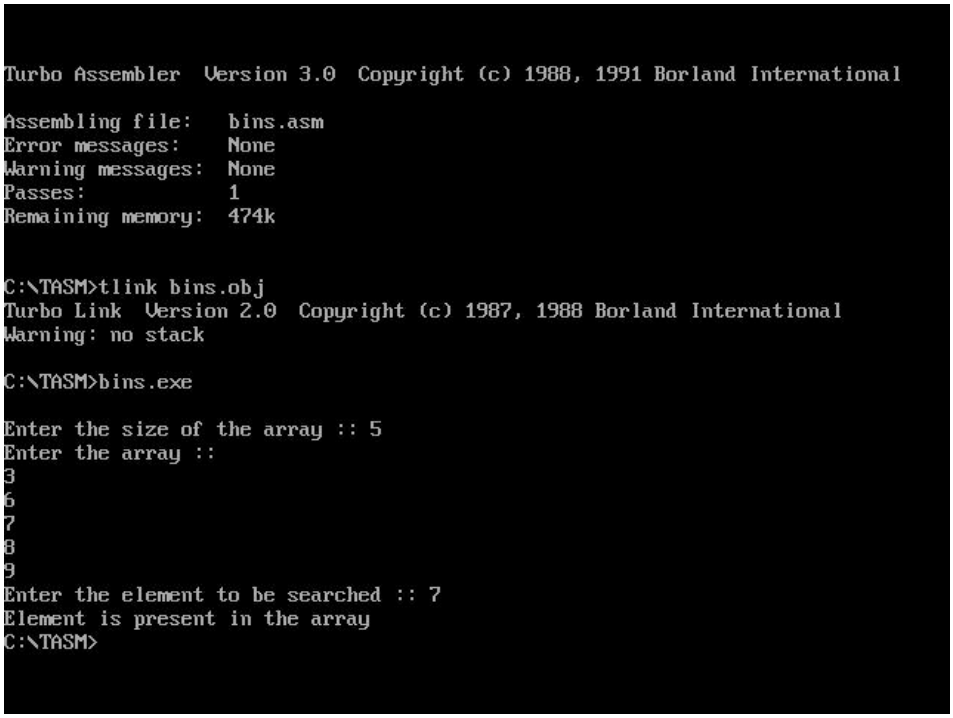
```
.code
.startup
MOV AH,09
MOV DX,OFFSET msg
INT 21H
MOV AH,01
INT 21H
SUB AL,30H
MOV AH,0
MOV CX,AX
MOV DATA1,AX

MOV AH,09
MOV DX,OFFSET msg2
INT 21H
MOV AH,0
MOV SI, 0
MOV BX, OFFSET ARRAY
L1: MOV DL, 0AH ; jump onto next line
MOV AH, 02H
INT 21H
MOV DX, SI ; input element of the array
```

```
MOV AH, 01H
INT 21H
SUB AL,30H
MOV SI, DX
MOV [BX + SI], AX
INC SI
LOOP L1

MOV AH,09
MOV DX,OFFSET msg3
INT 21H
MOV AH,01 ; Enter element to be searched
INT 21H
SUB AL,30H


MOV DATA2,AX
MOV CX,DATA1
MOV SI,0
MOV DI, DATA1
MOV BP, 0
MOV BX, OFFSET ARRAY
```

```
MOV AX, DATA1

L2: MOV SI, DI

ADD SI, BP

MOV AX, SI

MOV DL, 2

DIV DL


MOV AH,0

MOV DX,0

MOV SI,AX

MOV DX,DATA2

CMP [BX + SI],DL

JZ L3

CALL L4

LOOP L2

MOV AH, 09H

MOV DX,OFFSET fail ; if the element is not found

INT 21H

MOV AH, 4CH ; to forcefully terminate the program

INT 21H


L3: MOV AH, 09H
```

```
MOV DX,OFFSET success ; if the element is found
INT 21H
MOV AH, 4CH
INT 21H

L4 PROC NEAR
CMP [BX+SI], DL
JL L6
MOV DI, SI
RET
L6: MOV BP,SI
RET
L4 ENDP
.EXIT
END
```

# output




## Q5Write a program for binary to ascii conversion

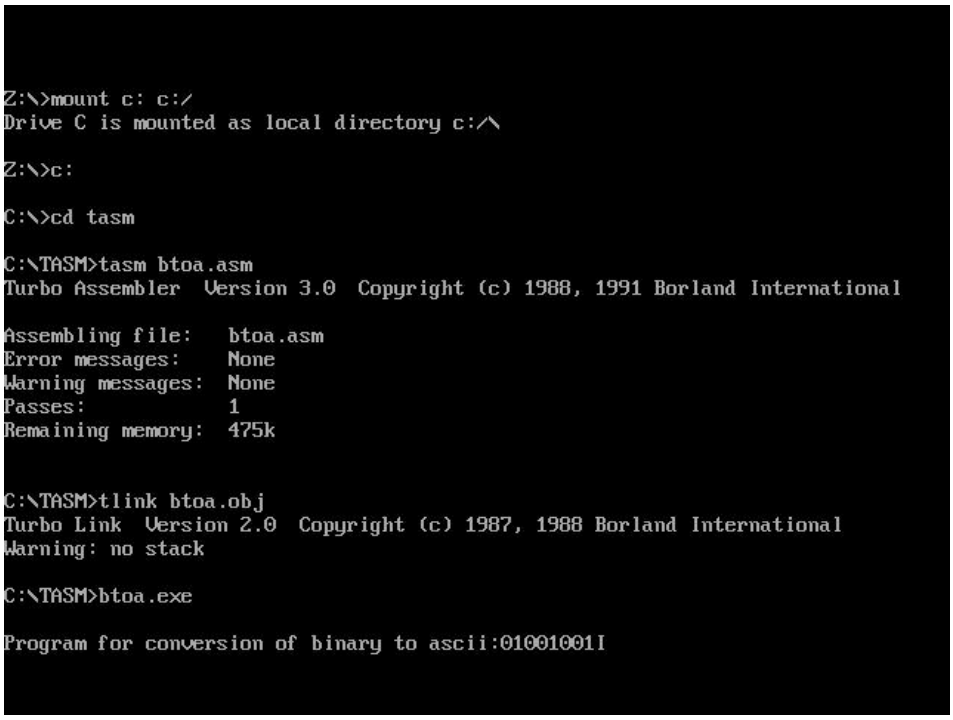
Code:

```
;6. Write a program for binary to ascii conversion

.model small

.data

      array db 8 dup(?)

      msg db 0dh,0ah,'Program for conversion of binary to
ascii:$'

      msg1 db 0dh,0ah,'Enter the element to array:$'


.code
```

```
.startup


mov dx,offset msg
mov ah,09h
int 21h
mov dx,offset msg1
mov si,0
mov cx,8
again:
    mov ah,01h
    int 21h
    sub al,30h
    mov array[si],al
    inc si
loop again




mov cx,8
mov al,01h
mov sp,0h
mov si,07h
```

```
mov bl,02h
again1:
      mov dl,array[si]
    cmp dl,01h
    jz  l2
here:
dec si
mul bl
loop again1

jmp ext

l2:
   add sp, ax
   jmp here

ext:
mov dx,sp
mov ah,02h
int 21h
end
```

# output



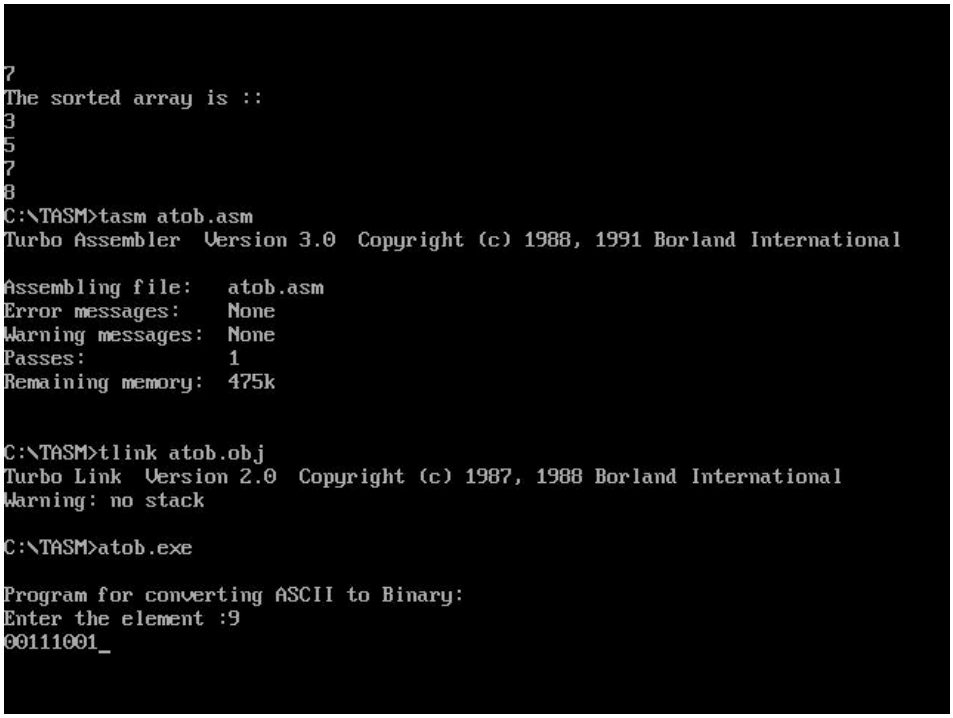

Q6. Write a program for ascii to binary conversion

```
;Write a program for ascii to binary conversion.

.model small

.data

    msg db 0dh,0ah,'Program for converting ASCII to
Binary:$'

    msg1 db 0dh,0ah,'Enter the element :$'


.code
```

```
.startup
mov dx,offset msg
 mov ah,09h
 int 21h
 mov dx,offset msg1
 mov ah,09h
 int 21h
 mov ah,01h
 int 21h
 mov bl,al
 mov dl,0Ah
 mov ah,02h
 int 21h
 mov cx,8
 again:
   shl bl,1
   jc l2
   jnc l3
   loop again
 l2:
   mov dl,31h
   mov ah,02h
```

```
    int 21h
    jmp l4
  l3:
    mov dl,30h
    mov ah,02h
    int 21h
    jmp l4
  l4:
    loop again

End
```

# output




Q7. Write a program two add and subtract two array

Code:

```
;ARRRAY addition & subtraction


.model small

.stack 1000h

.data
```

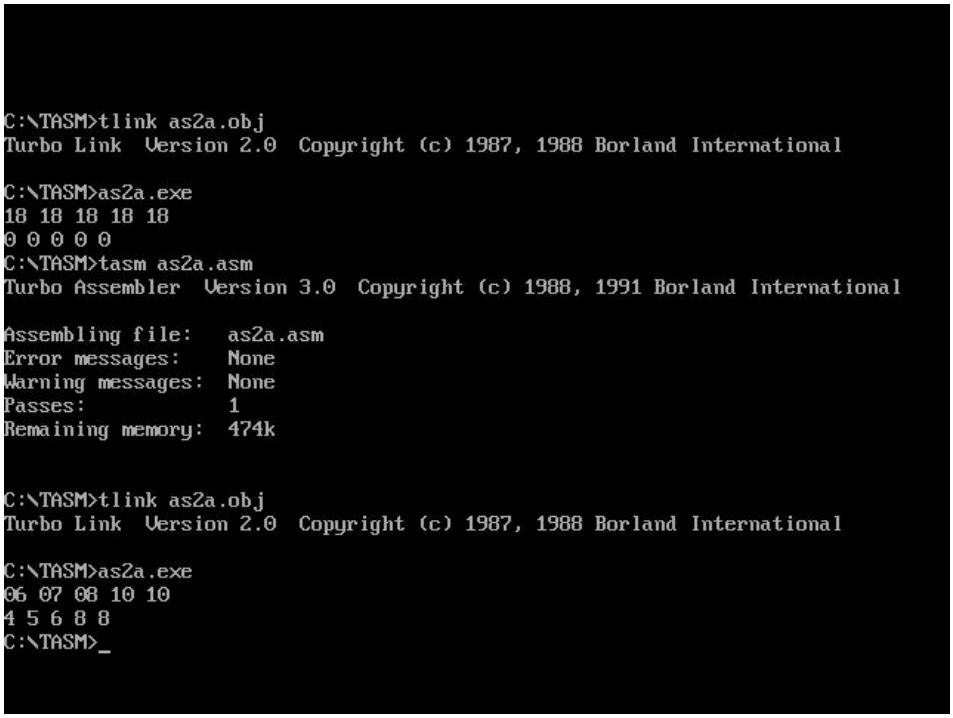
```
  arr1 db 05h, 06h, 07h, 09h, 09h
  arr2 db 01h, 01h, 01h, 01h, 01h
  diff db '$$'
  sum db '$$$'
  space db ' $'
  endl db 0ah,'$'
.code
  printSpace proc stdcall
    mov ah, 09h
    mov dx, offset space
    int 21h
    ret
  printSpace endp
  printSum proc stdcall
    mov ah, 09h
    mov dx, offset sum
  int 21h
   call printSpace
    ret
  printSum endp
 printSub proc stdcall
    mov ah, 09h
```

```
    mov dx, offset diff
    int 21h
    call printSpace
    ret
  printSub endp
  addition proc stdcall
    mov cx, 5
    mov si, 0
    a:
      xor bx, bx
      mov bl, byte ptr[arr1+si]
      add bl, byte ptr[arr2+si]
   cmp bl, 09h
      ja b
      c:
        or bx, 3030h

        mov byte ptr[sum], bh
        mov byte ptr[sum+1], bl

        call printSum
        inc si
```

```
        loop a
    ret

    b:
      xor ax, ax
      mov al, bl
      sub al, 0ah   ; sub bl, 09h    dec bl
      inc ah

      mov bx, ax
      jmp c
  addition endp

  subtraction proc stdcall
    mov cx, 5
    mov si, 0
    s:
      xor ax, ax
      xor bx, bx
      mov al, byte ptr[arr1+si]
      mov bl, byte ptr[arr2+si]
      sub al, bl
```

```
      or al, 30h
      mov byte ptr[diff], al

      call printSub
      inc si
      loop s
    ret
  subtraction endp
start:
  mov ax, @data
  mov ds, ax
  mov es, ax
 call addition
 mov ah, 09h
  mov dx, offset endl
  int 21h

  call subtraction
  jmp last
  last:
    .exit 0
end start
```

# output


C:\TASM>tlink as2a.obj
Turbo Link Version 2.0 Copyright (c) 1987, 1988 Borland International
C:\TASM>as2a.exe
18 18 18 18 18
0 0 0 0 0
C:\TASM>tasm as2a.asm
Turbo Assembler Version 3.0 Copyright (c) 1988, 1991 Borland International
Assembling file: as2a.asm
Error messages: None
Warning messages: None
Passes: 1
Remaining memory: 474k
C:\TASM>tlink as2a.obj
Turbo Link Version 2.0 Copyright (c) 1987, 1988 Borland International
C:\TASM>as2a.exe
06 07 08 10 10
4 5 6 8 8
C:\TASM>_