Jahangirnagar University (JU)

Institute of Information Technology

Lab Report-2

Assembly Language

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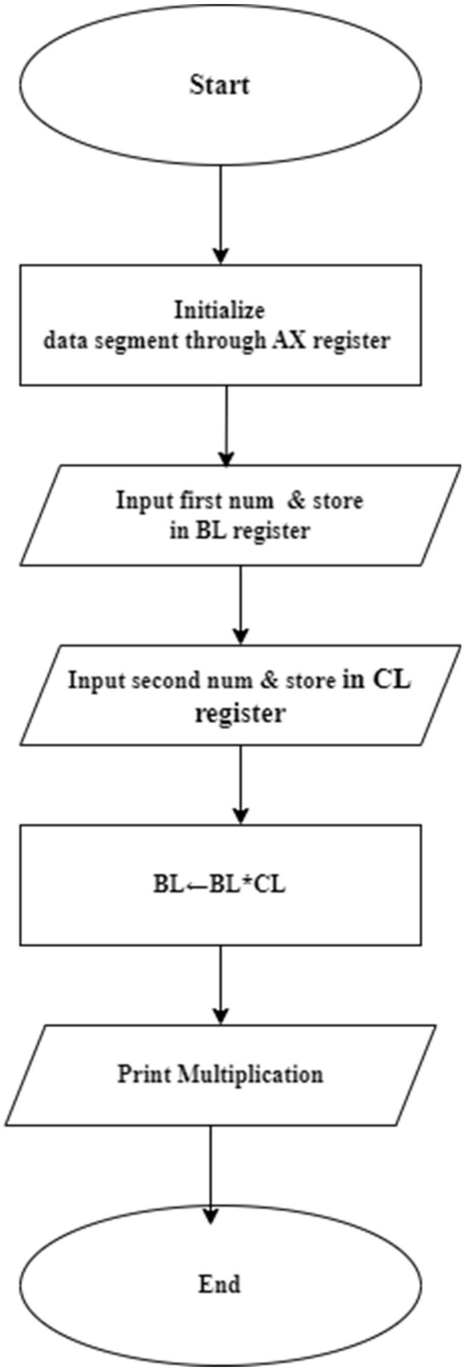
Experiment 1:

Multiplication of two 8-bit numbers (Using an assembly language program) [input as hex].

Algorithm:

Step1: Start
Step2: Initialize data segment through AX register in the DS register.
Step3: Read first digit in AL register through keyboard.
Step4: Call Input procedure to make a number from ASCII hexadecimal to a normal hexadecimal number.
Step5: Move contents of AL register to a BL.
Step6: Rotate the contents of BL register by 4 positions at left side.
Step7: Read a second digit in AL register through keyboard
Step8: Call Input procedure to make a number from ASCII hexadecimal to a normal hexadecimal number.
Step9: Add the contents of BL and AL store the result in BL.
Step10: Follow step 2 to 10 to input second number and store the result of number in CL
Step11: Multiply the contents of BL and CL and result gets stored in BL
Step12: Display the multiplication result in the screen
Step13: Stop

Flow Chart


Start
Initialize
data segment through AX register
Input first num & store
in BL register
Input second num & store in CL
register
BL←BL*CL
Print Multiplication
End

Program Source Code:

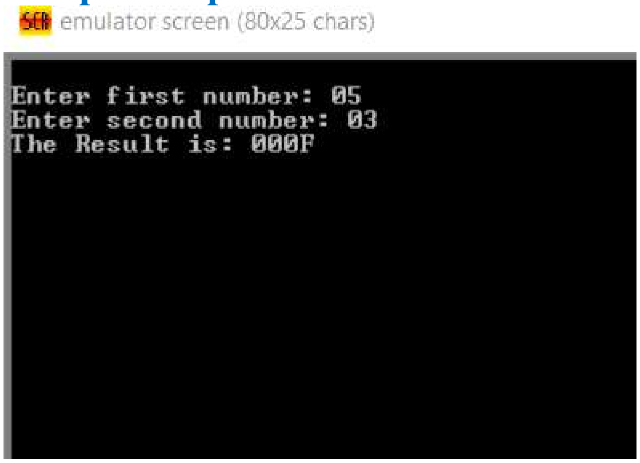
```
Data segment

 msg db 0dh,0ah,"Enter first number: $"
 msg1 db 0dh,0ah,"Enter second number: $"
 result db 0dh,0ah,"The Result is: $"

Data ends
Code segment
 assume CS:Code,DS:Data
start:
 mov ax,Data
 mov DS,ax

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

 mov ah,01h
 int 21h

 call AsciitoHex

 mov bl,al
 rol bl,4

 mov ah,01h
 int 21h

 call AsciitoHex

 add bl,al

 mov dx,offset msg1
 mov ah,09h
 int 21h

 mov ah,01h
 int 21h

 call AsciitoHex
 mov cl,al
 rol cl,4

 mov ah,01h
 int 21h
```

```
call AsciitoHex

add cl,al

mov al,bl
mov bl,cl
mul bl

mov cx,ax

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

and ax,0f000h
ror ax,12

mov bl,al
call AsciiConv

mov dl,bl
mov ah,02h
int 21h

mov ax,cx

and ax,0f00h
ror ax,8

mov bl,al
call AsciiConv

mov dl,bl
mov ah,02h
int 21h

mov ax,cx

and ax,00f0h
ror ax,4

mov bl,al
call AsciiConv

mov dl,bl
```

```
 mov ah,02h
 int 21h

 mov ax,cx

 and ax,000fh

 mov bl,al
 call AsciiConv

 mov dl,bl
 mov ah,02h
 int 21h

 mov ah,4ch
 int 21h

 AsciiConv proc
  cmp bl,0ah
  jc skip
  add bl,07h
  skip: add bl,30h
  ret
  endp

 AsciitoHex proc
  cmp al,41h
  jc skippy
  sub al,07h
  skippy: sub al,30h
  ret
  endp
Code ends
end start
```

Sample Input: 05,03

Sample Output: 000F



```
Enter first number: 05
Enter second number: 03
The Result is: 000F
```

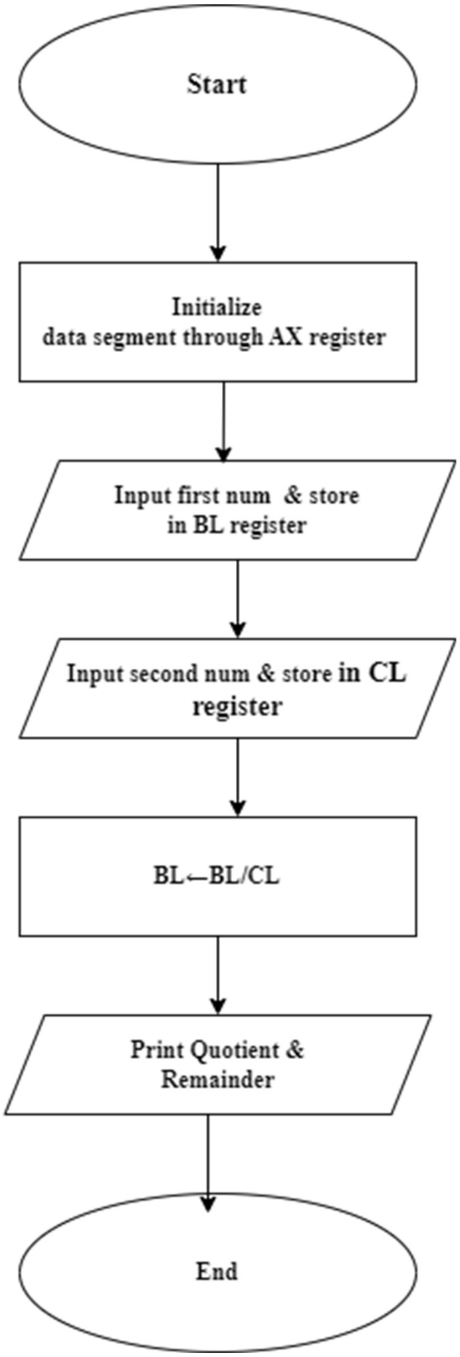
Experiment 2:

Division of two 8bit numbers (Using an assembly language program) [input as hex]

Algorithm:

Step1: Start
Step2: Initialize data segment through AX register in the DS register.
Step3: Read first digit in AL register through keyboard.
Step4: Call Input procedure to make a number from ASCII hexadecimal to a normal hexadecimal number.
Step5: Move contents of AL register to a BL.
Step6: Rotate the contents of BL register by 4 positions at left side.
Step7: Read a second digit in AL register through keyboard
Step8: Call Input procedure to make a number from ASCII hexadecimal to a normal hexadecimal number.
Step9: Add the contents of BL and AL store the result in BL.
Step10: Follow step 2 to 10 to input second number and store the result of number in CL
Step11: Divide the contents of BL and CL and result gets stored in BL
Step12: Display the multiplication result in the screen
Step13: Stop

Flow Chart:


Start
Initialize
data segment through AX register
Input first num & store
in BL register
Input second num & store in CL
register
BL←BL/CL
Print Quotient &
Remainder
End

Program Source Code:

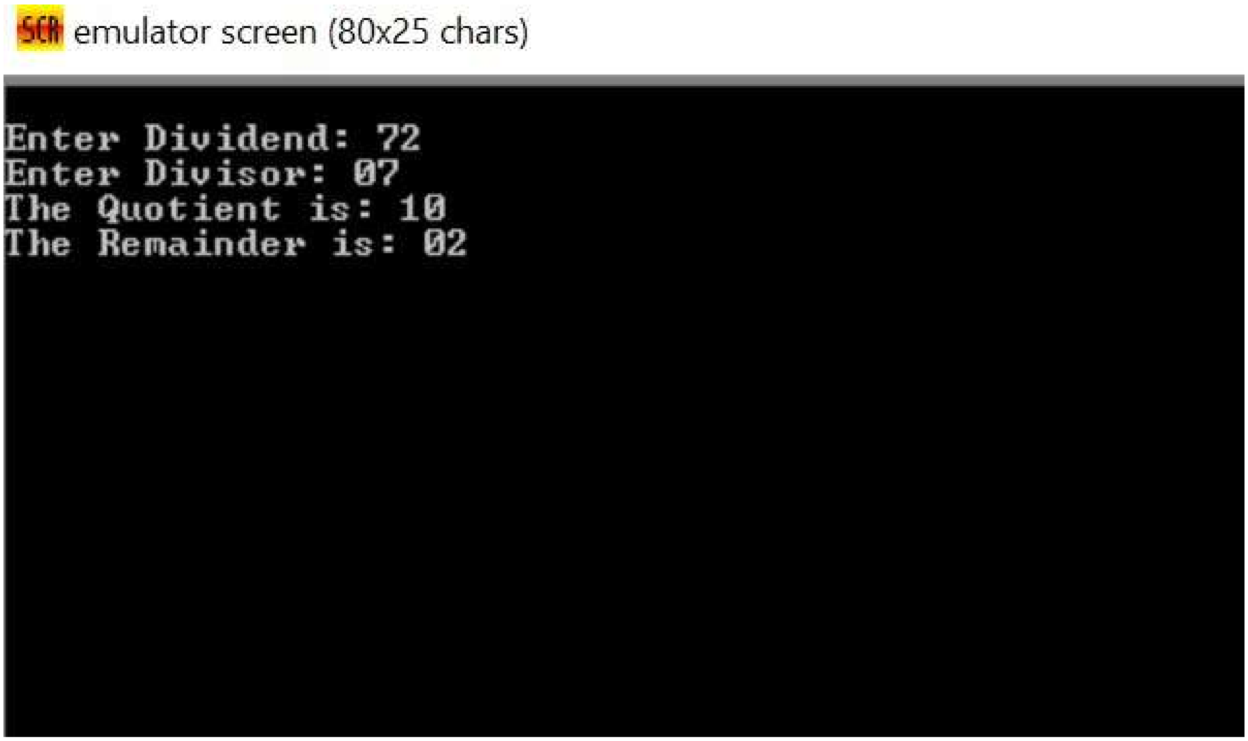
```
Data segment

 msg db 0dh,0ah,"Enter Dividend: $"
 msg1 db 0dh,0ah,"Enter Divisor: $"
 resq db 0dh,0ah,"The Quotient is: $"
 resr db 0dh,0ah,"The Remainder is: $"

Data ends
Code segment
 assume CS:Code,DS:Data
start:
 mov ax,Data
 mov DS,ax

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

 mov ah,01h
 int 21h

 call AsciitoHex

 mov bl,al
 rol bl,4

 mov ah,01h
 int 21h

 call AsciitoHex

 add bl,al

 mov dx,offset msg1
 mov ah,09h
 int 21h
```

```
mov ah,01h
int 21h

call AsciitoHex
mov cl,al
rol cl,4

mov ah,01h
int 21h

call AsciitoHex

add cl,al

and ax,0000h
mov al,bl
mov bl,cl
div bl

mov cx,ax

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

mov ax,cx

and al,0f0h
ror al,4

mov bl,al
call AsciiConv

mov dl,bl
mov ah,02h
int 21h
```

```
mov ax,cx

and al,0fh

mov bl,al
call AsciiConv

mov dl,bl
mov ah,02h
int 21h

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

mov ax,cx

and ah,0f0h
ror ah,4

mov bl,ah
call AsciiConv

mov dl,bl
mov ah,02h
int 21h

mov ax,cx

and ah,0fh

mov bl,ah
call AsciiConv

mov dl,bl
mov ah,02h
```

```
int 21h

mov ah,4ch
int 21h

AsciiConv proc
 cmp bl,0ah
 jc skip
 add bl,07h
 skip: add bl,30h
 ret
 endp
```

Sample Input: 72,07
Sample Output: Quotient 10
Remainder 02



```
Enter Dividend: 72
Enter Divisor: 07
The Quotient is: 10
The Remainder is: 02
```

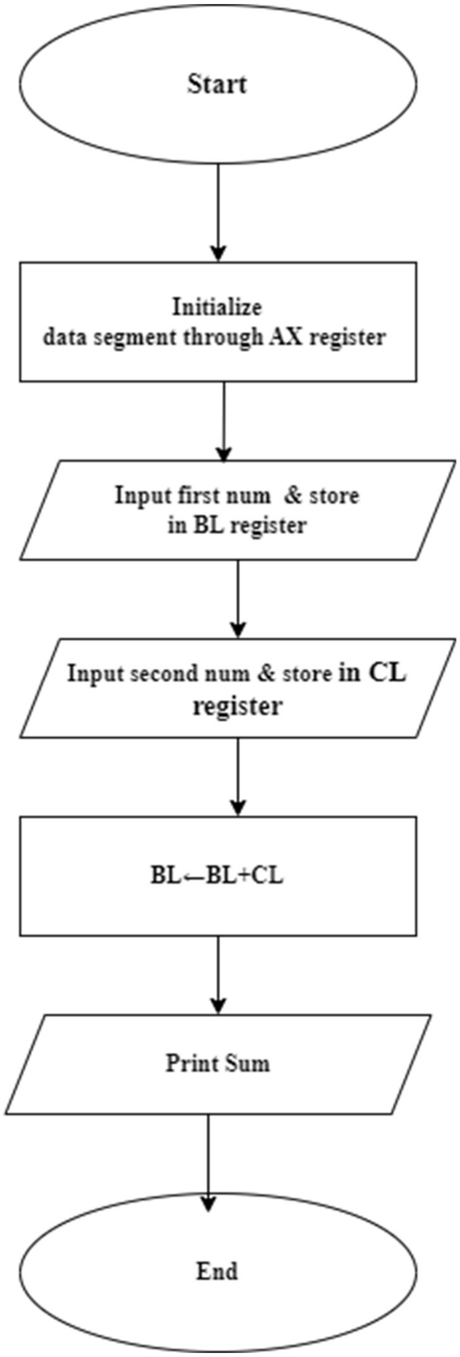
Experiment 3:

Addition of two 8-bit numbers (Using an assembly language program). [input as hex]

Algorithm:

Step1: Start
Step2: Initialize data segment through AX register in the DS register.
Step3: Read first digit in AL register through keyboard.
Step4: Call Input procedure to make a number from ASCII hexadecimal to a normal hexadecimal number.
Step5: Move contents of AL register to a BL.
Step6: Rotate the contents of BL register by 4 positions at left side.
Step7: Read a second digit in AL register through keyboard AL=35h
Step8: Call Input procedure to make a number from ASCII hexadecimal to a normal hexadecimal number.
Step9: Add the contents of BL and AL store the result in BL.
Step10: Follow step 2 to 10 to input second number and store the result of number in CL
Step11: Add the contents of BL and CL and result gets stored in BL
Step12: Display the addition result in the screen
Step13: Stop

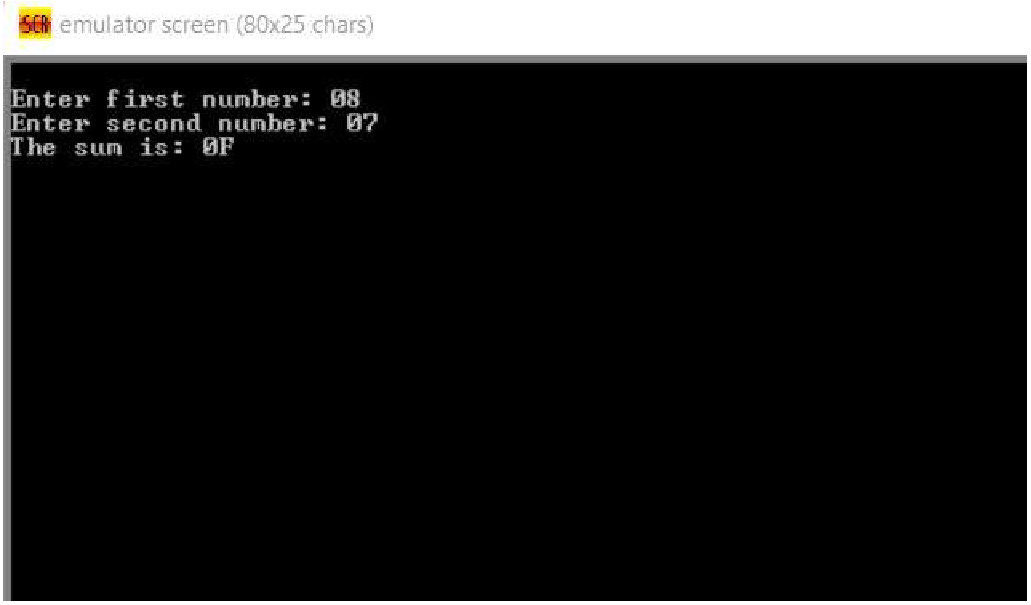
Flow Chart:


Start
Initialize
data segment through AX register
Input first num & store
in BL register
Input second num & store in CL
register
BL←BL+CL
Print Sum
End

Program Source Code:

```
Data segment

 msg db 0dh,0ah,"Enter first number: $"
 msg1 db 0dh,0ah,"Enter second number: $"
 result db 0dh,0ah,"The sum is: $"

Data ends
Code segment
 assume CS:Code,DS:Data
start:
 mov ax,Data ;
 mov DS,ax

 mov dx,offset msg ;
 mov ah,09h
 int 21h

 mov ah,01h ;
 int 21h

 sub al,30h ;
 mov bl,al
 rol bl,4

 mov ah,01h ;
 int 21h

 sub al,30h ;

 add bl,al ;

 mov dx,offset msg1 ;
 mov ah,09h
 int 21h

 mov ah,01h ;
 int 21h

 sub al,30h ;
 mov cl,al
 rol cl,4

 mov ah,01h ;
 int 21h
 sub al,30h ;

 add cl,al ;

 add bl,cl ;

 mov dx,offset result ;
 mov ah,09h
 int 21h

 mov cl,bl ;

 and bl,0f0h ;
 ror bl,4

 call AsciiConv ;

 mov dl,bl ;
 mov ah,02h
 int 21h

 mov bl,cl ;

 and bl,0fh ;

 call AsciiConv ;

 mov dl,bl ;
 mov ah,02h
 int 21h

 mov ah,4ch ;
 int 21h

 AsciiConv proc ;
  cmp bl,0ah ;
  jc skip
  add bl,07h
  skip: add bl,30h
  ret
  endp
Code ends
end star
```

Sample Input: 08,07
Sample Output: 0F



```
Enter first number: 08
Enter second number: 07
The sum is: 0F
```

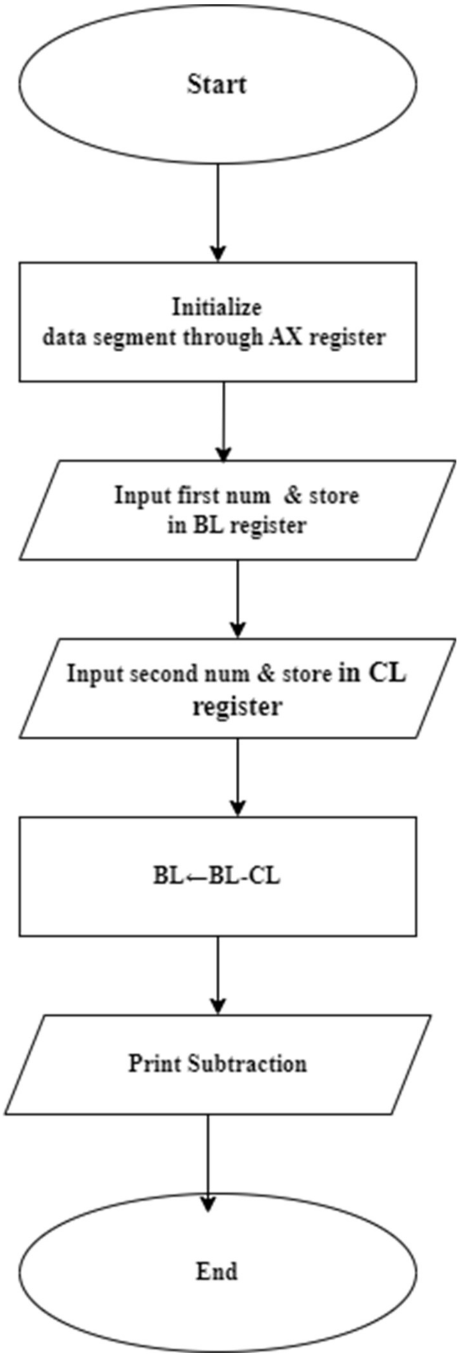
Experiment 4:

Subtraction of two 8-bit numbers (Using an assembly language program). [input as hex]

Algorithm:

Step1: Start
Step2: Initialize data segment through AX register in the DS register.
Step3: Read first digit in AL register through keyboard.
Step4: Call Input procedure to make a number from ASCII hexadecimal to a normal hexadecimal number.
Step5: Move contents of AL register to a BL.
Step6: Rotate the contents of BL register by 4 positions at left side.
Step7: Read a second digit in AL register through keyboard AL=35h
Step8: Call Input procedure to make a number from ASCII hexadecimal to a normal hexadecimal number.
Step9: Add the contents of BL and AL store the result in BL.
Step10: Follow step 2 to 10 to input second number and store the result of number in CL
Step11: Subtract the contents of BL and CL and result gets stored in BL
Step12: Display the subtraction result in the screen
Step13: Stop

Flow Chart:


Start
Initialize
data segment through AX register
Input first num & store
in BL register
Input second num & store in CL
register
BL←BL-CL
Print Subtraction
End

Program Source Code:

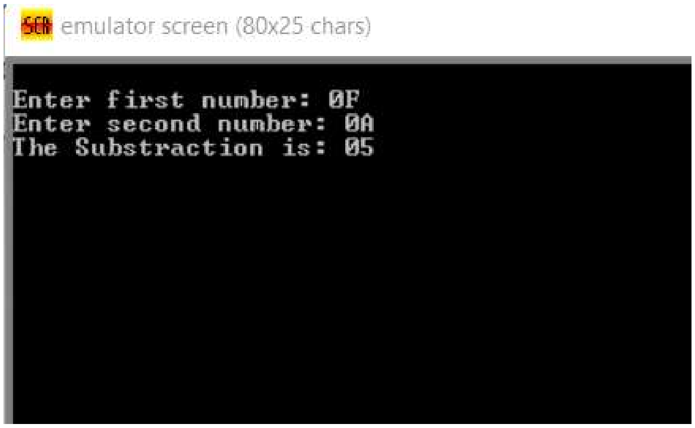
```
Data segment

 msg db 0dh,0ah,"Enter first number: $"
 msg1 db 0dh,0ah,"Enter second number: $"
 result db 0dh,0ah,"The Subtraction is: $"

Data ends
Code segment
 assume CS:Code,DS:Data
start:
 mov ax,Data ;
 mov DS,ax

 mov dx,offset msg ;
 mov ah,09h
 int 21h

 mov ah,01h ;
 int 21h

 sub al,30h ;
 mov bl,al
 rol bl,4

 mov ah,01h ;
 int 21h

 sub al,30h ;

 add bl,al ;

 mov dx,offset msg1 ;
 mov ah,09h
 int 21h

 mov ah,01h ;
```

```
int 21h

sub al,30h ;
mov cl,al
rol cl,4

mov ah,01h ;
int 21h

sub al,30h ;

add cl,al ;

sub bl,cl ;

mov dx,offset result ;
mov ah,09h
int 21h

mov cl,bl ;

and bl,0f0h ;
ror bl,4

call AsciiConv ;

mov dl,bl ;
mov ah,02h
int 21h

mov bl,cl ;

and bl,0fh ;

call AsciiConv ;

mov dl,bl ;
```

```
 mov ah,02h
 int 21h

 mov ah,4ch ;
 int 21h

 AsciiConv proc ;
  cmp bl,0ah ;
  jc skip
  add bl,07h
  skip: add bl,30h
  ret
  endp
Code ends
end start
```

Sample Input: 0F,0A

Sample Output: 05



```
Enter first number: 0F
Enter second number: 0A
The Substraction is: 05
```