

ASM Laboratory



Name: Soham Das

Section: A1

Roll No: 002311001004

IT-UG2

1. Write an Assembly Language Program to add two sixteen-bit numbers. The numbers are stored in DS: 0030H and DS: 0040H. Store the result in DS: 0050H, DS: 0051H, and DS: 0052H.

```
.model small
.stack 100h
.data
.code
```



```
main proc
mov ax, @data
mov ds, ax
mov cl, 00h
mov si, 0030h
mov ax, [si]
mov si, 0040h
mov bx, [si]
add bx, ax
adc cl, cl
mov si, 0050h
mov [si], bx
add si, 02h

mov [si], cl
int 03h
mov ah, 4ch
int 21h
main endp
end main
```

```
DOSBox 0.74-3, Cpu speed: 3000 cycles, Frameskip 0, Program: DEBUG
Copyright (C) Microsoft Corp 1983-1987. All rights reserved.

C:\>a1q1.exe

C:\>debug a1q1.exe
-t
AX=076C BX=0000 CX=0024 DX=0000 SP=0100 BP=0000 SI=0000 DI=0000
DS=075A ES=075A SS=076D CS=076A IP=0003 NU UP EI PL NZ NA PO NC
076A:0003 8ED8 MOV DS,AX
-e 076C:0030
076C:0030 3D.11 FF.22
-e 076C:0040
076C:0040 E4.33 40.44
-g=0000
AX=2211 BX=6644 CX=0000 DX=0000 SP=0100 BP=0000 SI=0052 DI=0000
DS=076C ES=075A SS=076D CS=076A IP=001F NU UP EI PL NZ NA PO NC
076A:001F CC INT 3
-d 076C:0050,0051
076C:0050 44 66 Df
-
```

2. Write an Assembly Language Program to subtract an 8-bit numbers stored in DS: 0030H from a number stored in DS: 0040H using 2's complement method. Store the result in DS: 0050H, and DS: 0051H.

```
.model small
.stack 100h
.data
.code

main proc
mov ax, @data
mov ds, ax
mov si, 0030h
mov al, [si]
not al
add al, 01h
mov si, 0040h
add al, [si]
jc li
;neg al
;do not use <neg> as it will modify the carry
not al
inc al

li:
mov si, 0050h
mov [si], al
mov ah, 00h
cmc
adc ah, ah
inc si

mov [si], ah
int 03h
mov ah, 4ch
int 21h
main endp
end main
```



```
DOSBox 0.74-3, Cpu speed: 3000 cycles, Frameskip 0, Program: DEBUG
Copyright (C) Microsoft Corp 1983-1987. All rights reserved.

C:\>a1q2.exe

C:\>debug a1q2.exe
-t

AX=076C BX=0000 CX=002B DX=0000 SP=0100 BP=0000 SI=0000 DI=0000
DS=075A ES=075A SS=076D CS=076A IP=0003  NU UP EI PL NZ NA PO NC
076A:0003 8ED8          MOV     DS,AX
-e 076c:0030
076C:0030 3D.22

-e 076c:0040
076C:0040 E4.11

-g=0000

AX=0111 BX=0000 CX=002B DX=0000 SP=0100 BP=0000 SI=0051 DI=0000
DS=076C ES=075A SS=076D CS=076A IP=0026  NU UP EI PL NZ NA PO NC
076A:0026 CC          INT     3
-d 076c:0050,0051
076C:0050 11 01          . .
-
```

3. Write a program to transfer a block of 8 data bytes from memory location DS: 0030H to DS: 0040H.

```
.model small
.stack 100h
.data
.code

main proc
mov ax,@data
mov ds,ax

mov es,ax
mov si,0030h
mov di,0040h
cld
mov cx,0008h
rep movsb ;repeat command

mov ah,4ch
int 21h
main endp
end main
```

```
DOSBox 0.74-3, Cpu speed: 3000 cycles, Frameskip 0, Program: DEBUG
0 Warning Errors
0 Severe Errors

C:\>link a1q3.obj:

Microsoft (R) Overlay Linker Version 3.60
Copyright (C) Microsoft Corp 1983-1987. All rights reserved.

C:\>debug a1q3.exe
-t

AX=076B BX=0000 CX=0017 DX=0000 SP=0100 BP=0000 SI=0000 DI=0000
DS=075A ES=075A SS=076C CS=076A IP=0003  NU UP EI PL NZ NA PO NC
076A:0003 8ED8      MOV     DS,AX
-e 076b:0030
076B:0030 00.10  52.20  50.30  E8.40  EA.50  48.60  83.70  C4.80
076B:0038 04.

-g=0000

Program terminated normally
-d 076b:0040,0047
076B:0040 10 20 30 40 50 60 70 80      . 00P`p.
```

4. Write an 8086 Assembly Language Program for the addition of 7 eight-bit numbers stored from DS: 0030H. Store the result in DS: 0050H and DS: 0051H.

```
dosseg
.model small
.stack 100h
.data
.code

main proc
mov ax,@data
mov ds,ax
mov si,0030h
mov di,0050h
mov cx,0007h
mov ax,0000h
mov bx,0000h

11:  mov bl,[si]
      add ax,bx
      inc si
      loop 11

mov [di],ax
int 03h
```



```

mov ah,4ch
int 21h
main endp
end main

```

```

DOSBox 0.74-3, Cpu speed: 3000 cycles, Frameskip 0, Program: DEBUG
C:\>link a1q4.obj;

Microsoft (R) Overlay Linker Version 3.60
Copyright (C) Microsoft Corp 1983-1987. All rights reserved.

C:\>debug a1q4.exe
-t
AX=076D BX=0000 CX=0032 DX=0000 SP=0100 BP=0000 SI=0000 DI=0000
DS=075A ES=075A SS=076E CS=076A IP=0013 NU UP EI PL NZ NA PO NC
076A:0013 8ED8 MOV DS,AX
-e 076d:0030
076D:0030 E4.11 40.22 50.33 8B.44 C3.55 8C.66 C2.77
-g=0000
AX=01DC BX=0077 CX=0000 DX=0000 SP=0100 BP=0000 SI=0037 DI=0050
DS=076D ES=075A SS=076E CS=076A IP=002D NU UP EI PL NZ NA PO NC
076A:002D CC INT 3
-076d:0050,0051
^ Error
-d 076D:0050,0051
076D:0050 DC 01

```

[Note: $11+22+\dots+77 = 01DC$]

- Write an 8086 Assembly Language Program for the addition of 5 sixteen-bit numbers stored from DS: 0030H. Store the result in DS: 0050H, DS: 0051H, DS: 0052H.

```

dosseg
.model small
.stack 100h
.data
.code

main proc
mov ax,@data
mov ds,ax
mov si,0030h
mov di,0050h
mov cx,0005h
mov ax,0000h

```

```

mov bx,0000h
mov dl,00h

11:  mov bx,[si]
      add ax,bx
      adc dl,00h
      inc si
      inc si
      loop 11
mov [di],ax
inc di
inc di
mov [di],dl

int 03h
mov ah,4ch
int 21h
main endp
end main

```

```

DOSBox 0.74-3, Cpu speed: 3000 cycles, Frameskip 0, Program: DEBUG
C:\>link a1q5.obj;
Microsoft (R) Overlay Linker Version 3.60
Copyright (C) Microsoft Corp 1983-1987. All rights reserved.
C:\>debug a1q5.exe
-t
AX=076D BX=0000 CX=003C DX=0000 SP=0100 BP=0000 SI=0000 DI=0000
DS=075A ES=075A SS=076E CS=076A IP=0013  NU UP EI PL NZ NA PO NC
076A:0013 8ED8          MOV     DS,AX
-e 076d:0030
076D:0030 E4.ff  40.ff  50.ff  8B.ff  C3.ff  8C.ff  C2.ff  05.ff
076D:0038 0C.ff  00.ff  52.
-g=0000
AX=FFFB BX=FFFF CX=0000 DX=0004 SP=0100 BP=0000 SI=003A DI=0052
DS=076D ES=075A SS=076E CS=076A IP=0037  NU UP EI PL NZ NA PO NC
076A:0037 CC          INT     3
-d 076d:0050,0052
076D:0050 FB FF 04          ...
-

```

[Note: FFFF+FFFF+FFFF+FFFF+FFFF = 04FFFB]

- 6. Write an Assembly Language Program for the addition of five BCD numbers stored from DS: 0030H. Store the result in DS: 0040H and DS: 0041H.**

```
dosseg
.model small
.stack 100h
.data
.code

main proc
    mov ax, @data
    mov ds, ax

    mov si, 0030h
    mov di, 0040h
    mov cx, 0005h
    mov ax, 0000h
    mov dl, 00h

l1:
    mov bl, [si]
    add al, bl
    daa
    adc dl, 00h
    inc si
    loop l1

    mov [di], al
    inc di
    mov [di], dl

    int 03h
    mov ah, 4Ch
    int 21h

main endp
end main
```



```

DOSBox 0.74-3, Cpu speed: 3000 cycles, Frameskip 0, Program: DEBUG
0 Severe Errors

C:\>link a1q6.obj;

Microsoft (R) Overlay Linker Version 3.60
Copyright (C) Microsoft Corp 1983-1987. All rights reserved.

C:\>debug a1q6.exe
-t

AX=076D BX=0000 CX=003B DX=0000 SP=0100 BP=0000 SI=0000 DI=0000
DS=075A ES=075A SS=076E CS=076A IP=0013  NU UP EI PL NZ NA PO NC
076A:0013 8ED8          MOV     DS,AX
-e 076d:0030
076D:0030 E4.1      40.2      50.3      8B.4      C3.5

-g=0000

AX=0015 BX=0005 CX=0000 DX=0000 SP=0100 BP=0000 SI=0035 DI=0041
DS=076D ES=075A SS=076E CS=076A IP=0033  NU UP EI PL NZ NA PE NC
076A:0033 CC          INT     3
-d 076d:0040,0041
076D:0040 15 00

```

7. Write an Assembly Language Program to subtract a BCD number stored in DS: 0040H from a BCD number stored in DS: 0050H. Store the result in DS: 0060H and DS: 0061H.

```

dosseg
.model small
.stack 100h
.data
.code

main proc
mov ax,@data
mov ds,ax
mov si,0050h
mov al,[si]
mov si,0040h
sub al,[si]
das

mov si,0060h
mov [si],al
mov ah,00h
adc ah,ah
inc si

```

```

mov [si],ah

int 03h
mov ah,4ch
int 21h
main endp
end main

```

```

DOSBox 0.74-3, Cpu speed: 3000 cycles, Frameskip 0, Program: DEBUG
C:\>debug q7.exe
-t
AX=076D BX=0000 CX=0031 DX=0000 SP=0100 BP=0000 SI=0000 DI=0000
DS=075A ES=075A SS=076E CS=076A IP=0013  NU UP EI PL NZ NA PO NC
076A:0013 8ED8      MOV     DS,AX
-e 076d:0050
076D:0050  FA.50

-e 076d:0040
076D:0040  C4.30

-g=0000
AX=0020 BX=0000 CX=0031 DX=0000 SP=0100 BP=0000 SI=0061 DI=0000
DS=076D ES=075A SS=076E CS=076A IP=002C  NU UP EI PL NZ NA PO NC
076A:002C CC      INT     3
-076d:0060,0060
^ Error
-e 076d:0060,0060
^ Error
-d 076d:0060,0060
076D:0060  20
_

```

- Write an Assembly Language Program to multiply two eight bit number stored in DS: 0040H and DS: 0050H. Store the result from DS: 0060H.

```

dosseg
.model small
.stack 100h
.data
.code
main proc
mov ax,@data
mov ds,ax
mov si,0040h
mov al,[si]
mov si,0050h
mov bl,[si]

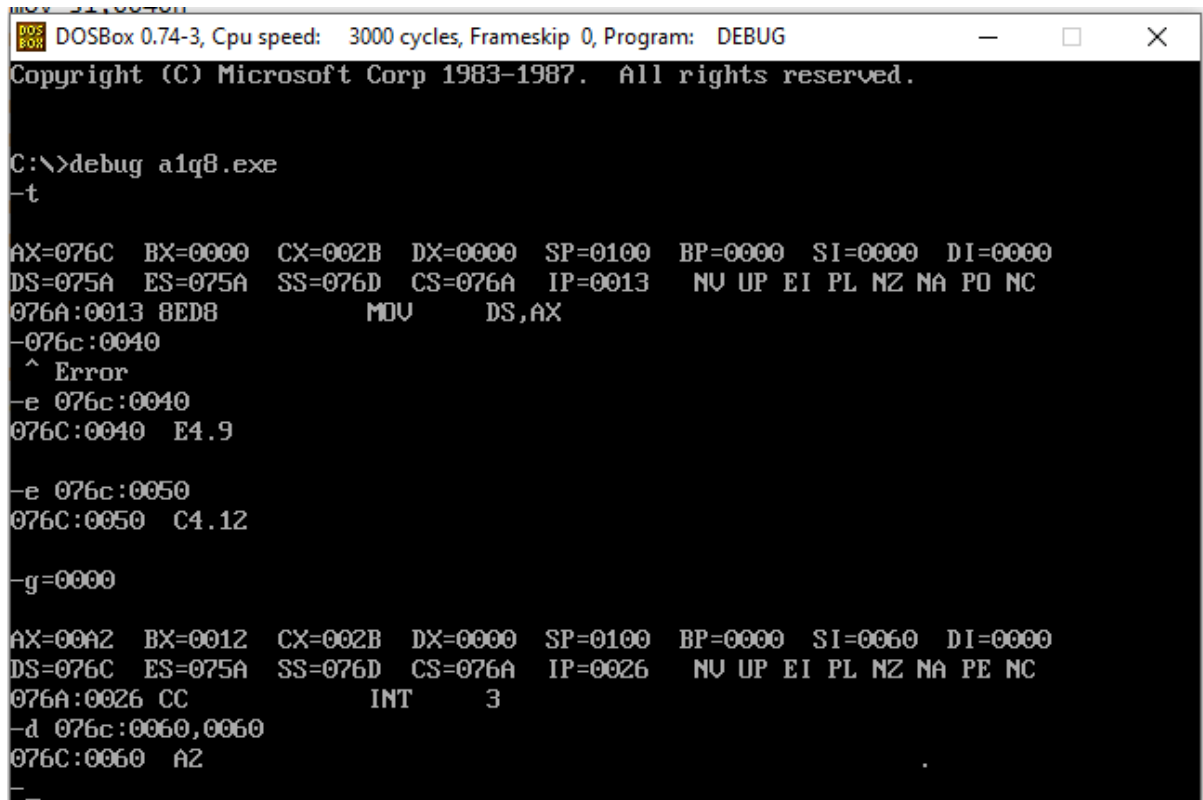
```

```

mul bl

mov si,0060h
mov [si],ax
int 03h
mov ah,4ch
int 21h
main endp
end main

```



```

DOSBox 0.74-3, Cpu speed: 3000 cycles, Frameskip 0, Program: DEBUG
Copyright (C) Microsoft Corp 1983-1987. All rights reserved.

C:\>debug a1q8.exe
-t

AX=076C BX=0000 CX=002B DX=0000 SP=0100 BP=0000 SI=0000 DI=0000
DS=075A ES=075A SS=076D CS=076A IP=0013  NU UP EI PL NZ NA PO NC
076A:0013 8ED8          MOV     DS,AX
-076c:0040
^ Error
-e 076c:0040
076C:0040 E4.9

-e 076c:0050
076C:0050 C4.12

-g=0000

AX=00A2 BX=0012 CX=002B DX=0000 SP=0100 BP=0000 SI=0060 DI=0000
DS=076C ES=075A SS=076D CS=076A IP=0026  NU UP EI PL NZ NA PE NC
076A:0026 CC          INT     3
-d 076c:0060,0060
076C:0060 A2

```

- Write an Assembly Language Program to multiply two sixteen bit number stored in DS:0040H and DS:0050H. Store the result from DS: 0060H.

```

dosseg
.model small
.stack 100h
.data
.code

main proc

mov ax,@data
mov ds,ax

```

```

mov si,0040h
mov ax,[si]
mov si,0050h
mov bx,[si]
mul bx

```

```

mov si,0060h
mov [si],ax
mov si,0062h
mov [si],dx

```

```

int 03h
mov ah,4ch
int 21h

```

```

main endp
end main

```

```

DOSBox 0.74-3, Cpu speed: 3000 cycles, Frameskip 0, Program: DEBUG

Microsoft (R) Overlay Linker Version 3.60
Copyright (C) Microsoft Corp 1983-1987. All rights reserved.

C:\>debug a1q9.exe
-t
AX=076D BX=0000 CX=0030 DX=0000 SP=0100 BP=0000 SI=0000 DI=0000
DS=075A ES=075A SS=076D CS=076A IP=0013  NU UP EI PL NZ NA PO NC
076A:0013 8ED8      MOV     DS,AX
-e 076d:0040
076D:0040 C4.12  04.13  50.
-e 076d:0050
076D:0050 FA.02  FE.19  81.
-g=0000
AX=E824 BX=1902 CX=0030 DX=01DC SP=0100 BP=0000 SI=0062 DI=0000
DS=076D ES=075A SS=076D CS=076A IP=002B  OV UP EI PL NZ AC PE CY
076A:002B CC      INT     3
-d 076d:0060,0062
076D:0060 24 E8 DC      $..

```

10. Write an Assembly Language Program to divide 88H by 33H. Store the quotient in DS: 0060H and remainder in DS: 0061H.

```

.model small

```

```

.stack 100h
.data
.code

main proc
mov ax, @data
mov ds, ax
mov si,0040h
mov ax,[si]
mov si,0050h
mov bl,[si]
div bl
mov si,0060h
mov [si],ax

int 03h
mov ah,4ch
int 21h
main endp
end main

```

```

DOSBox 0.74-3, Cpu speed: 3000 cycles, Frameskip 0, Program: DEBUG

Microsoft (R) Overlay Linker Version 3.60
Copyright (C) Microsoft Corp 1983-1987. All rights reserved.

C:\>debug a1q10.exe
-t

AX=076B BX=0000 CX=001B DX=0000 SP=0100 BP=0000 SI=0000 DI=0000
DS=075A ES=075A SS=076C CS=076A IP=0003  NU UP EI PL NZ NA PO NC
076A:0003 8ED8      MOV     DS,AX
-e 076b:0040
076B:0040 3D 88 FF.00
-e 076b:0050
076B:0050 E4 33 40.00
-g=0000

AX=2202 BX=0033 CX=001B DX=0000 SP=0100 BP=0000 SI=0060 DI=0000
DS=076B ES=075A SS=076C CS=076A IP=0016  NU UP EI PL NZ NA PO NC
076A:0016 CC      INT     3
-d 076b:0060,0061
076B:0060 02 22
076B:0061 02 22

```

11. Write an Assembly Language Program to divide 2222H by 55H. Store the quotient from DS: 0060H and remainder in DS: 0062H.

```
dosseg
.model small
.stack 100h
.data
.code

main proc

    mov ax,@data
    mov ds,ax
    mov si,0040h
    mov ax,[si]
    mov si,0050h
    mov bx,[si]
    div bx

    mov si,0060h
    mov [si],ax
    mov si,0062h
    mov [si],dx

    int 03h
    mov ah,4ch
    int 21h

main endp
end main
```

```
DOSBox 0.74-3, Cpu speed: 3000 cycles, Frameskip 0, Program: DEBUG
Microsoft (R) Overlay Linker Version 3.60
Copyright (C) Microsoft Corp 1983-1987. All rights reserved.

C:\>debug a1q11.exe
-t

AX=076D BX=0000 CX=0030 DX=0000 SP=0100 BP=0000 SI=0000 DI=0000
DS=075A ES=075A SS=076D CS=076A IP=0013  NU UP EI PL NZ NA PO NC
076A:0013 8ED8      MOV     DS,AX
-e 076d:0040
076D:0040 C4.22  04.22

-e 076d:0050
076D:0050 FA.55  FE.00

-g=0000

AX=0066 BX=0055 CX=0030 DX=0044 SP=0100 BP=0000 SI=0062 DI=0000
DS=076D ES=075A SS=076D CS=076A IP=002B  NU UP EI PL NZ AC PE CY
076A:002B CC      INT     3
-d 076d:0060,0062
076D:0060 66 00 44      f.D
-
```