

# ASM Laboratory



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**Section: A1**

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**IT-UG2**

1. Write an Assembly Language Program to add 3 X 3 matrices. Assume the matrices are stored in the form of lists (row wise). First matrix is stored from DS:0030H and the second matrix is stored from DS:0040. Store the result of the addition in the third lists starting from DS:0050H.

```
.model small
```

```
.stack 100h
```

```
.data
```

```
.code
```

```
main proc
```

```
mov ax,@data
```

```
mov es,ax
```

```
mov ds, ax
```

```
mov si,0030h
```

```
mov di,0040h
```

```
mov bx,0050h
```

```
mov cx,0009h
```

```
l1:
```

```
    mov al,[si]
```

```
    add al,[di]
```

```
    mov [bx],al
```

```
    inc di
```

```
    inc bx
```

```
    inc si
```

```
    loop l1
```

```
int 03h
```

```
mov ah,4ch
```

```
int 21h
```

```
main endp
```

```
end main
```

```
DOSBox 0.74-3, Cpu speed: 3000 cycles, Frameskip 0, Program: DEBUG
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C:\>debug a5q1.exe
-t

AX=076C BX=0000 CX=0023 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 8EC0          MOV     ES,AX
-e 076c:0030
076C:0030 3D.1  FF.2  FF.3  74.4  03.5  E9.6  ED.7  00.8
076C:0038 C4.9  5E.

-e 076c:0040
076C:0040 E4.9  40.8  50.7  8B.6  C3.5  8C.4  C2.3  05.2
076C:0048 0C.1  00.

-g=0000

AX=070A BX=0059 CX=0000 DX=0000 SP=0100 BP=0000 SI=0039 DI=0049
DS=076C ES=076C SS=076D CS=076A IP=001E  NU UP EI PL NZ NA PE NC
076A:001E CC          INT     3
-d 076c:0050,005B
076C:0050 0A 0A 0A 0A 0A 0A 0A 0A-0A
.....
```

2. Write an Assembly Language Program to convert an eight bit binary number stored in DS:0030H into its equivalent BCD number. Stored the result in DS:0040H.

; Problem 2

```
dosseg
```

```
.model small
```

```
.stack 100h
```

```
.data
```

```
.code
```

```
main proc
```

```
mov ax,@data
```

```
mov es,ax
```

```
mov ds, ax
```

```
mov si,0030h
```

```
mov dx,0000h
```

```
mov ax,0000h
```

```
mov cl,[si]
```

```
l2:
```

```
    cmp cl,00
```

```
    jz l1
```

```
    dec cl
```

```
    mov al,dl
```

```
    add al,01h
```

```
    daa
```

```
    mov dl,al
```

```
    mov al,dh
```

```
    adc al,00h
```

```
    daa
```

```
    mov dh,al
```

```
    jmp l2
```

```
l1:
```

```
    mov si,0040h
```

```
    mov[si],dx
```

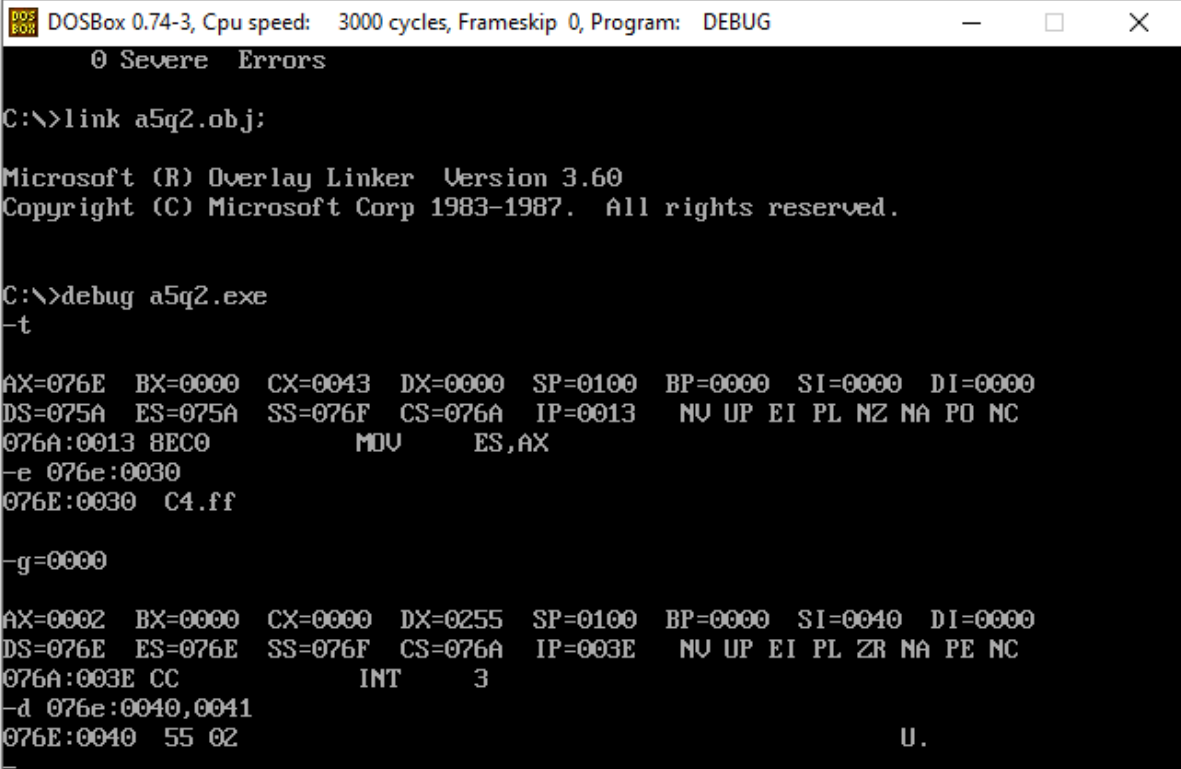
int 03h

mov ah,4ch

int 21h

main endp

end main



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

C:\>link a5q2.obj;

Microsoft (R) Overlay Linker Version 3.60
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C:\>debug a5q2.exe
-t

AX=076E BX=0000 CX=0043 DX=0000 SP=0100 BP=0000 SI=0000 DI=0000
DS=075A ES=075A SS=076F CS=076A IP=0013  NU UP EI PL NZ NA PO NC
076A:0013 8EC0          MOV     ES,AX
-e 076e:0030
076E:0030  C4.ffa
-g=0000

AX=0002 BX=0000 CX=0000 DX=0255 SP=0100 BP=0000 SI=0040 DI=0000
DS=076E ES=076E SS=076F CS=076A IP=003E  NU UP EI PL ZR NA PE NC
076A:003E CC          INT     3
-d 076e:0040,0041
076E:0040  55 02          U.
-
```

3. Write an Assembly program to convert a BCD number stored in DS:0030H into its equivalent hexadecimal number. Stored the result in DS:0040H.

; Problem 3

dosseg

.model small

.stack 100h

.data

.code

main proc

mov ax,@data

mov ds,ax

mov si,0030h

mov di,0040h

mov al,[si]

mov bl,al

and al,0f0h

mov cl,04h

ror al,cl

mov dl,0ah

mul dl

mov dx,ax

mov al,bl

and al,0fh

mov ah,00h

add ax,dx

mov [di],ax

int 03h

mov ah,4ch

int 21h

main endp

end main

```

C:\>debug a5q3.exe
-t

AX=076D BX=0000 CX=003A 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 E4.96

-g=0000

AX=0060 BX=0096 CX=0004 DX=005A SP=0100 BP=0000 SI=0030 DI=0040
DS=076D ES=075A SS=076E CS=076A IP=0035  NU UP EI PL NZ AC PE NC
076A:0035 CC          INT     3
-d 076d:0040
076D:0040 60 00 50 8D 86 FA FE 50-E8 17 73 83 C4 06 8B B6  ` .P....P..s.....
076D:0050 FA FE 81 E6 FF 00 C6 82-FB FE 00 2B C0 50 8D 86  .....+.P..
076D:0060 FB FE 50 E8 08 6A 83 C4-04 0B C0 75 03 E9 A5 00  ..P..j.....u....
076D:0070 C7 86 7A FF 00 00 EB 04-FF 86 7A FF A1 70 08 39  ..z.....z..p.9
076D:0080 86 7A FF 72 03 E9 8D 00-8A 86 FA FE 2A E4 40 50  .z.r.....*.@P
076D:0090 8D 86 FA FE 50 8D 86 7C-FF 50 E8 C5 72 83 C4 06  ....P..!..P..r...
076D:00A0 8B 9E 7A FF D1 E3 D1 E3-8B 87 CC 17 8B 97 CE 17  ..z.....
076D:00B0 89 46 FC 89 56 FE 05 0C-00 52 50 E8 42 48 83 C4  .F..U....RP.BH..

```

4. Write an Assembly program to convert a binary number stored in DS:0030H into its equivalent gray code. Stored the result in DS:0040H.

dosseg

.model small

.stack 100h

.data

.code

main proc

mov ax,@data

mov ds,ax

mov si,0030h

mov di,0040h

mov al,[si]

```

mov dl,[si]

clc

rcr al,01

xor al,dl

mov [di],al

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 a5q4.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
-e 076c:0030
076C:0030 3D.10  FF.10  FF.
-g=0000
AX=0718 BX=0000 CX=002B DX=0010 SP=0100 BP=0000 SI=0030 DI=0040
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:0040
076C:0040 18 40 50 8B C3 8C C2 05-0C 00 52 50 E8 C1 48 83  .@P.....RP..H.
076C:0050 C4 04 50 8D 86 FA FE 50-E8 17 73 83 C4 06 8B B6  ..P....P..s.....
076C:0060 FA FE 81 E6 FF 00 C6 82-FB FE 00 2B C0 50 8D 86  .....+.P..
076C:0070 FB FE 50 E8 08 6A 83 C4-04 0B C0 75 03 E9 A5 00  ..P..j.....u....
076C:0080 C7 86 7A FF 00 00 EB 04-FF 86 7A FF A1 70 08 39  ..z.....z..p.9
076C:0090 86 7A FF 72 03 E9 8D 00-8A 86 FA FE 2A E4 40 50  .z.r.....*.@P
076C:00A0 8D 86 FA FE 50 8D 86 7C-FF 50 E8 C5 72 83 C4 06  ....P..i.P..r...
076C:00B0 8B 9E 7A FF D1 E3 D1 E3-8B 87 CC 17 8B 97 CE 17  ..z.....

```

5. Write an Assembly program to find the factorial of a number stored in DS:0030H. Stored the result in DS:0040H.

```

dosseg

.model small

.stack 100h

```



```
.data

.code

main proc

mov ax,@data

mov ds,ax

mov si,0030h

mov di,0040h

mov bx,0000h

mov ax,0000h

mov al,[si]

mov cx,[si]

mov bl,al

l1:

    dec bl

    cmp bl,00h

    jz l2

    mul bx

    mov dx,ax

    loop l1

l2:    mov [di],dx

int 03h

mov ah, 4ch

int 21h

main endp

end main
```

```
DOSBox 0.74-3, Cpu speed: 3000 cycles, Frameskip 0, Program: DEBUG
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Run File [A5Q4.EXE]:
List File [NUL.MAP]:
Libraries [.LIB]:

C:\>

C:\>debug a5q4.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 E4.5

-g=0000

AX=0078 BX=0000 CX=4001 DX=0078 SP=0100 BP=0000 SI=0030 DI=0040
DS=076D ES=075A SS=076E CS=076A IP=0036  NU UP EI PL ZR NA PE NC
076A:0036 CC          INT     3
-d 076d:0040,0041
076D:0040 78 00                      x.
-
```

(note: 78 in hex is 120 in decimal and  $5! = 120$ )