National University of Computer and Emerging Sciences

Lab Manual

Computer Organization and Assembly Language

Lab 9

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Section	D
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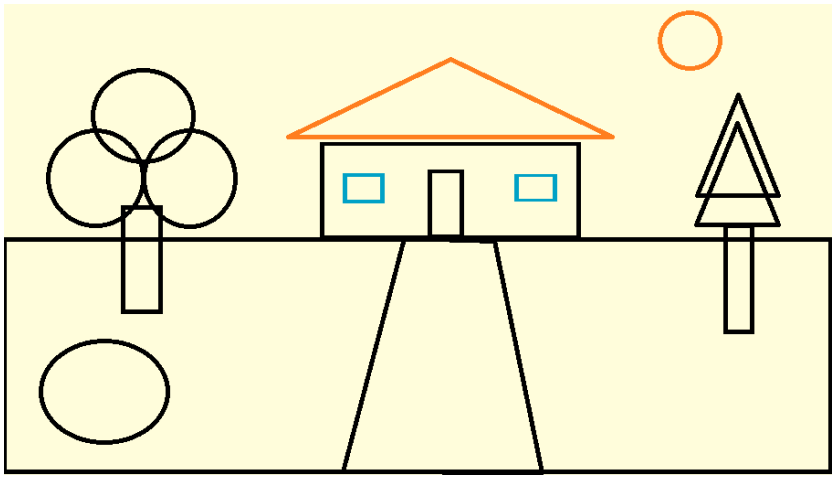
Note for all questions: You can make as many memory variables, subroutines as you need. Must read all the manual before starting.

ACTIVITY 1: [10 Marks]



In the previous lab, you have used **int 10h** for graphics displaying a Diamond using **AX = 0x000D service** which extended your graphic resolution to 320 X 200. This lab is using **AX = 0x0010 service** which extended your graphic resolution to 640 X 350.

Write a comprehensive program which:

1) Generates an animation for the line drawing shown in the attached picture.
2) Your program should start working on the animation after you press any key from the keyboard.
3) Once the animation is finished your program should wait for a key press before moving forward.
4) Circle drawing programs are given to you, for printing

[hint]

Use the Circle Drawing program in **the Appendix**. For more information about the graphics mode please refer to [1] and Chapter 12 of textbook.

REFERENCES

[1] http://vitaly_filatov.tripod.com/ng/asm/asm_023.1.html
[2] http://www.dosbox.com/download.php?main=1
[3] http://sourceforge.net/projects/nasm
[4] http://www.nasm.us/
[5] http://www.programmersheaven.com/download/21643/download.aspx (AFD)

Appendix

```
; circle in graphics mode
[org 0x0100]
jmp start
; coordinates of a circle of radius 24
x24: dw 48,47,44,40,36,30,24,17,12,7,3,0,0,0,3,7,11,17,23,30,36,40,44,47,48
y24: dw 24,30,36,40,44,47,48,47,44,40,36,30,24,17,11,7,3,0,0,0,3,7,11,17,23
; coordinates of a circle of radius 45
x45: dw
90,89,88,86,83,79,75,70,64,58,52,46,40,34,28,22,17,12,8,5,2,0,0,0,0,2,5,8,12,17,22,28,34,40,46,52,58,6
4,70,75,79,83,86,88,89,90
y45: dw
45,51,57,63,68,73,78,82,85,87,89,89,89,88,86,83,80,76,71,66,60,54,48,41,35,29,23,18,13,9,6,3,1,0,0,0,2
,4,7,11,16,21,26,32,38,44
; coordinates of a circle of radius 72
x72: dw
144,143,142,141,139,137,134,130,127,122,118,113,108,102,96,90,84,78,72,65,59,53,47,41,36,30,25,21,
16,13,9,6,4,2,1,0,0,0,1,2,4,6,9,13,16,21,25,30,35,41,47,53,59,65,71,78,84,90,96,102,108,113,118,122,12
7,130,134,137,139,141,142,143,144
y72: dw
72,78,84,90,96,102,108,113,118,122,127,130,134,137,139,141,142,143,144,143,142,141,139,137,134,1
30,127,122,118,113,108,102,96,90,84,78,72,65,59,53,47,41,35,30,25,21,16,13,9,6,4,2,1,0,0,0,1,2,4,6,9,1
3,16,21,25,30,35,41,47,53,59,65,71
; coordinates of a circle of radius 120
x120: dw
240,239,239,238,237,235,234,232,229,226,223,220,217,213,209,204,200,195,190,185,180,174,168,163,
157,151,144,138,132,126,120,113,107,101,95,88,82,76,71,65,60,54,49,44,39,35,30,26,22,19,16,13,10,7,
5,4,2,1,0,0,0,0,0,1,2,4,5,7,10,13,16,19,22,26,30,35,39,44,49,54,59,65,71,76,82,88,95,101,107,113,119,1
26,132,138,144,151,157,163,168,174,180,185,190,195,200,204,209,213,217,220,223,226,229,232,234,2
35,237,238,239,239,240
y120: dw
120,126,132,138,144,151,157,163,168,174,180,185,190,195,200,204,209,213,217,220,223,226,229,232,
234,235,237,238,239,239,240,239,239,238,237,235,234,232,229,226,223,220,217,213,209,204,200,195,
190,185,180,174,168,163,157,151,144,138,132,126,120,113,107,101,95,88,82,76,71,65,59,54,49,44,39,
35,30,26,22,19,16,13,10,7,5,4,2,1,0,0,0,0,0,1,2,4,5,7,10,13,16,19,22,26,30,35,39,44,49,54,59,65,71,76,8
2,88,95,101,107,113,119
; setting up the parameters
counter :  db 0;
radius  :  equ 120  ; choose radius (24, 45, 72, 120)
xoffset: equ 0     ; change to move circle along x axis
yoffset: equ 0     ; change to move circle along y axis

start:
mov si, x120 ; change x array as radius
mov di, y120 ; change y array as radius

mov ax, 0x0010   ; set 640 x 350 graphics mode
```

```
int 0x10        ; bios video services
mov ax, 0x0C07   ; put pixel in white color
xor bx, bx       ; page number 0
mov cx, [si]     ; first x position
add cx, xoffset ; moving point along x axis
mov dx, [di]     ; first y position
add dx, yoffset ; moving point along y axis
l1:
int 0x10   ; bios video services
add si, 2  ; next location address
add di, 2  ; next location address
mov cx, [si]
add cx, xoffset
mov dx, [di]
add dx, yoffset
inc byte[counter]
cmp byte[counter], radius ; stopping condition
jle l1      ; jump if less
mov ah, 0            ; service 0 – get keystroke
int 0x16             ; bios keyboard services
mov ax, 0x0003       ; 80x25 text mode
int 0x10             ; bios video services
mov ax, 0x4c00       ; terminate program
int 0x21
```