ST. XAVIER’S COLLEGE

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**Computer Graphics Lab Assignment #6**

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**STATEMENT: DRAW A ELLIPSE USING MID POINT ALGORITHM**

**ALGORITHM:**

1. Input center (xc,yc) and rx and ry for the ellipse and obtain the first point as

(x0,y0)=(0,ry)

1. Calculate initial decision parameter value in Region 1 as

P10=ry2-rx2ry+rx2/4

1. At each xk position, in Region 1, starting at k = 0 , compute

xk+1 =xk 1

If p1k<0, then the next point to plot is

P1k+1=P1k+2ry2xk+1+ry2

Otherwise next point to plot is

yk-1=yk-1

P1k+1=P1k+2ry2xk+1+ry2-2rx2yk+1

1. Calculate the initial value of decision parameter at region 2 using last calculated point say (x0,y0) in region 1 as

P20=ry2(x0+1/2)2+rx2(y0-1)2-rx2y2

1. At each yk position in Region 2 starting at k=0, perform computation

Yk+1=y-1;

If p2k>0,then

Xk+1=xk

P2k+1=p2k-2rx2(yk-1)+rx2

Otherwise

Xk+1=xk+1

P2k+1=p2k+2ry2xk+1-2rx2yk+1+rx2

where xk+1=xk+1 and yk+1=yk-1

1. Determine the symmetry points in other 3 quadrants.
2. Move each calculated point (xk, yk) on to the centered (xc,yc) ellipse path as

xk = xk + xc;

yk = yk + yc

1. Repeat the process for region 1 until and region until 2ry2xk>=2rx2yk and region until (xk, yk) =(rx,0)

**SOURCE CODE:**

//---------------------------------------------------------------------------

#include <vcl\vcl.h>

#pragma hdrstop

#include "Unit1.h"

//---------------------------------------------------------------------------

#pragma resource "\*.dfm"

TForm1 \*Form1;

int xc,yc,r1,r2,x,y,p0;

//---------------------------------------------------------------------------

\_\_fastcall TForm1::TForm1(TComponent\* Owner)

: TForm(Owner)

{

}

//---------------------------------------------------------------------------

void \_\_fastcall TForm1::Button1Click(TObject \*Sender)

{

xc=StrToInt(Edit1->Text);

yc=StrToInt(Edit2->Text);

r1=StrToInt(Edit3->Text);

r2=StrToInt(Edit4->Text);

x=0;

y=r2;

p0=(r2\*r2)-(r1\*r1\*r2)+(r1\*r1/4);

do{

Image1->Canvas->Pixels[xc+x][yc-y]=RGB(100,200,150);

Image1->Canvas->Pixels[xc-x][yc+y]=RGB(100,200,0);

Image1->Canvas->Pixels[xc+x][yc+y]=RGB(200,125,150);

Image1->Canvas->Pixels[xc-x][yc-y]=RGB(200,15,150);

if(p0<0){

x=x+1;

p0=p0+(2\*r2\*r2\*x)+(r2\*r2);

}

else{

x=x+1;

y=y-1;

p0=p0+(2\*r2\*r2\*x+r2\*r2)-(2\*r1\*r1\*y);

}

}while((2\*r2\*r2\*x)<(2\*r1\*r1\*y));

p0=(((float)x+0.5)\*((float)x+0.5)\*r2\*r2+(y-1)\*(y-1)\*r1\*r1-r1\*r1\*r2\*r2);

do{

Image1->Canvas->Pixels[xc+x][yc-y]=RGB(100,200,150);

Image1->Canvas->Pixels[xc-x][yc+y]=RGB(100,200,0);

Image1->Canvas->Pixels[xc+x][yc+y]=RGB(200,125,150);

Image1->Canvas->Pixels[xc-x][yc-y]=RGB(200,15,150);

if(p0>0){

y=y-1;

p0=p0-(2\*r1\*r1\*y)+(r1\*r1);

}

else{

y=y-1;

x=x+1;

p0=p0+(2\*r2\*r2\*x)-(2\*r1\*r1\*y)-r1\*r1;

}

} while (y>=0);

}

//---------------------------------------------------------------------------

**OUTPUT:**

