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C2)

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Experiment 4

Aim: Implement midpoint drawing ellipse method in C.

Theory:

Algorithm:

1. Start.
2. Declare $r_x, r_y, x, y, m, dx, dy, p_1, p_2$.
3. Initialise point of region 1 as $x = 0$
   $y = r_y$.
4. Calculate
   $p = r_y^2 - r_x^2 r_y + \frac{1}{4} r_x^2$
   $dx = 2 r_y^2 x$.
   $dy = 2 r_x^2 y$.
5. Update values of dx, and dy after each iteration
6. Repeat steps while $(dx < dy)$
   plot (x, y)
   if $(p < 0)$
   update $x = y + 1$
   $p_1 = r_y^2 [2x + 3]$
   else
   update $x = x + 1$
   $y = y - 1$
7. when $dx > dy$, plot region 2
8. calculate $p_2 = r_y^2 (x + 1/2)^2 + r_x^2 (y - 1)^2 - r_x^2 r_y^2$

9. $xy > 0$
if ($P_2 > 0$)
update $y = y - 1$
$P_2 = P_2 - 2ry^2 + r$
else
$x = x + 1$
$y = y - 1$
$P_2 = P_2 + 2rx^2 [2x] - 2ry + r$

10. END

PROGRAM:

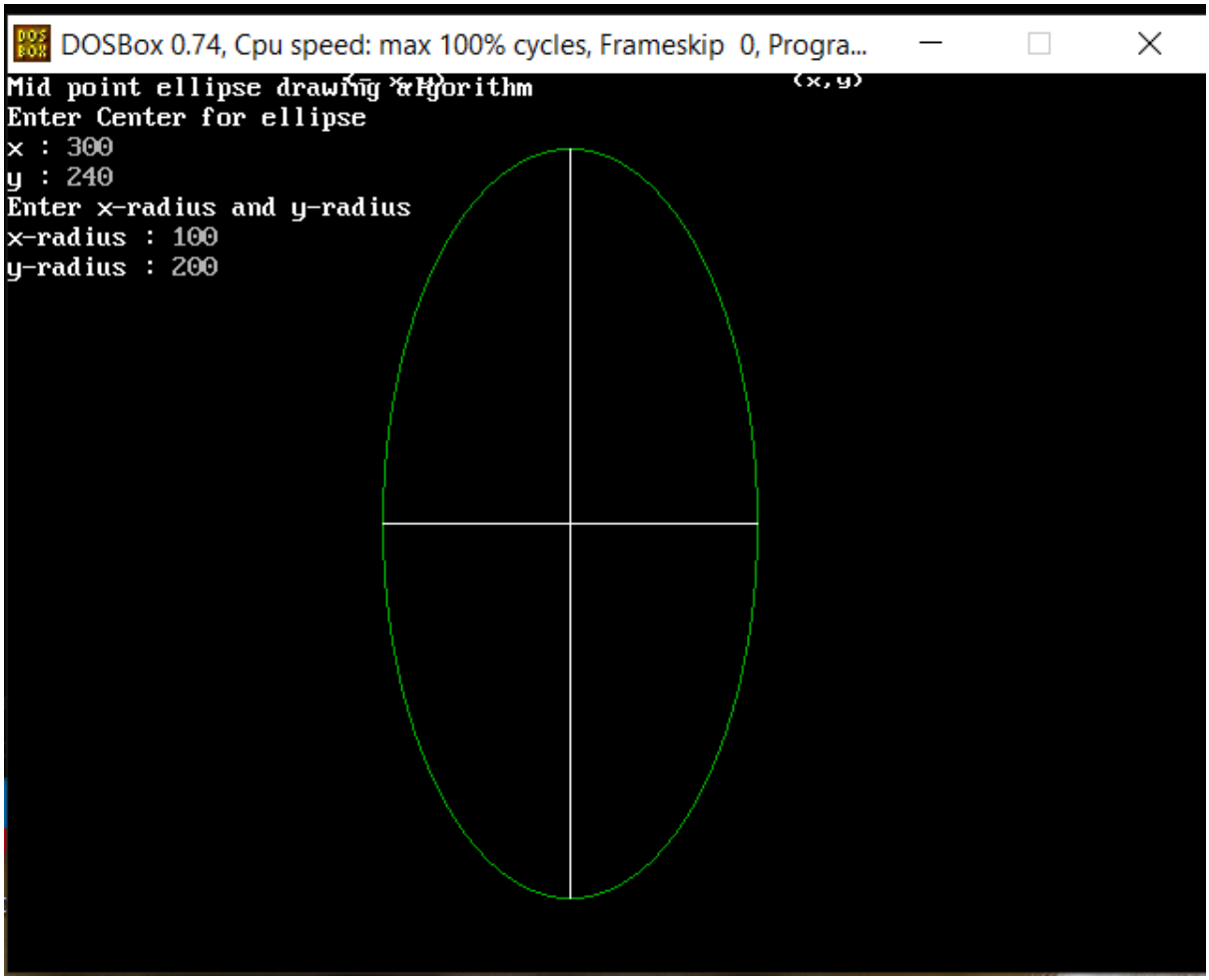
Code:

```
#include <conio.h>
#include <stdio.h>
#include <graphics.h>
void main()
{
int gd=DETECT,gm;
float x,y,xc,yc,rx,ry,pk,pk1;
clrscr();
initgraph(&gd,&gm,"..\\bgi");
printf("Mid point ellipse drawing algorithm\n");
printf("Enter Center for ellipse\nx : ");
scanf("%f",&xc);
printf("y : ");
scanf("%f",&yc);
printf("Enter x-radius and y-radius\nx-radius : ");
scanf("%f",&rx);
printf("y-radius : ");
scanf("%f",&ry);
x=0;
y=ry;
pk=(ry*ry)-(rx*rx*ry)+((rx*rx)/4);
while((2*x*ry*ry)<(2*y*rx*rx))
{
if(pk<=0)
{
```

```
x=x+1;
pk1=pk+(2*ry*ry*x)+(ry*ry);
}
else
{
x=x+1;
y=y-1;
pk1=pk+(2*ry*ry*x)-(2*rx*rx*y)+(ry*ry);
}
pk=pk1;
putpixel(xc+x,yc+y,2);
putpixel(xc-x,yc+y,2);
putpixel(xc+x,yc-y,2);
putpixel(xc-x,yc-y,2);
}
pk=((x+0.5)*(x+0.5)*ry*ry)+((y-1)*(y-1)*rx*rx)-(rx*rx*ry*ry);
while(y>0)
{
if(pk>0)
{
y=y-1;
pk1=pk-(2*rx*rx*y)+(rx*rx);
}
else
{
x=x+1;
y=y-1;
```

```
pk1=pk+(2*ry*ry*x)-(2*rx*rx*y)+(rx*rx);
}
pk=pk1;
putpixel(xc+x,yc+y,2);
putpixel(xc-x,yc+y,2);
putpixel(xc+x,yc-y,2);
putpixel(xc-x,yc-y,2);
}
line(xc+rx,yc,xc-rx,yc);
line(xc,yc+ry,xc,yc-ry);
outtextxy(xc+(1.2*rx),yc-(1.2*ry),"(x,y)");
outtextxy(xc-(1.2*rx),yc+(1.2*ry),"(- x,-y)");
outtextxy(xc+(1.2*rx),yc+(1.2*ry),"(x,- y)");
outtextxy(xc-(1.2*rx),yc-(1.2*ry),"(- x,y)");
getch();
}
```

OUTPUT:


DOSBox 0.74, Cpu speed: max 100% cycles, Frameskip 0, Progra...
Mid point ellipse drawing algorithm
Enter Center for ellipse
x : 300
y : 240
Enter x-radius and y-radius
x-radius : 100
y-radius : 200
(x,y)