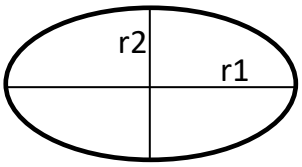
Ellipse Algorithm:

Ellipse is defined by center (x1, y1), first radius (r1) and second radius (r2). To draw ellipse, we must:



1. Find initial point:

x = x1 + r1

y = y1

2. Find the increment value:

x = x1+ r1 * cos (Θ) ……..(1)

y = y1+ r2 * sin (Θ)

by find the differential of equations (1)

dx = -r1 * sin (Θ) *d(Θ) ….……(2)

dy = r2 * cos (Θ) * d(Θ)

and from equation (1)

cos (Θ) = (x - x1) / r1 ……...……..(3)

sin (Θ) = (y – y1) / r2

substitute equation (3) in (2)

dx = -r1 * (y – y1) / r2*d(Θ) → dx = -r1/r2 * (y – y1) *d(Θ)

dy = r2 * (x - x1) / r1 * d(Θ) → dy = r2 /r1 * (x - x1) * d(Θ)

where d(Θ) = 1 / max (r1, r2)

3. The iterations (number of points) are depend on angle rotation from 0 to 360.

Ellipse Algorithm: center (x1, y1), first radius (r1), second radius (r2)

Begin

x = x1+ r1

y = y1

theta = 0

dtheta = 1 / max (r1, r2)

while theta < 360

SetPixel (x, y, color)

x = x – (r1 / r2) * (y – y1) * dtheta

y = y + (r2 / r1) * (x – x1) * dtheta

theta = theta + dtheta

End while

End

Arc Algorithm

Arc is define by center (x1, y1) , radius (r), start angle (Θ) and endangle (ß). To draw Arc we must:

1. Find initial point:

x = x1 + r * cos(Θ)……(1)

y = y1 + r * sin (Θ)

2. Find the incremental value by find the differential of equations (1) :

dx = -r * sin (Θ) *d(Θ) ……(2)

dy = r * cos (Θ) * d(Θ)

and from equation (1)

cos (Θ) = (x - x1) / r ……..……..(3)

sin (Θ) = (y – y1) / r

substitute equation (3) in (2)

dx = - (y – y1) *d(Θ) → dx = (y1 – y) *d(Θ)

dy = (x - x1) * d(Θ)

where d(Θ) = 1 / r

3. The iterations (number of points) are begin from startangle(Θ) to endangle(ß).

Arc Algorithm: center (x1 , y1) , radius (r),startangle(Θ), endangle(ß)

Begin

```
Θ = startangle * 3.14 / 180
ß = endangle * 3.14 / 180
dtheta= 1 / r
x = x1 + r * cos (Θ)
y = y1 + r * sin (Θ)
SetPixel(x ,y , color)
While Θ < ß
        x = x +( y1 – y) *d(Θ)
        y = y +( x - x1) * d(Θ)
        SetPixel(x ,y , color)
        Θ = Θ + d(Θ)
End while
```

End