Midpoint Ellipse Drawing Algorithm

Step 1: Input the center coordinates and radii of the ellipse

(xc, yc), rx, ry

Step 2: Initialize the starting point

x = 0

y = ry

Step 3: Calculate the initial decision parameter for Region 1

$p1 = ry^2 - (rx^2 \times ry) + (1/4 \times rx^2)$

Step 4: Calculate initial values

$dx = 2 \times ry^2 \times x$

$dy = 2 \times rx^2 \times y$

Step 5: Region 1 processing (slope > −1)

Repeat while dx < dy

a) Plot the symmetric points

(xc + x, yc + y), (xc − x, yc + y),

(xc + x, yc − y), (xc − x, yc − y)

b) If p1 < 0

x = x + 1

$dx = dx + 2 \times ry^2$

$p1 = p1 + dx + ry^2$

c) Else

x = x + 1

y = y − 1

$dx = dx + 2 \times ry^2$

$dy = dy - 2 \times rx^2$

$p1 = p1 + dx - dy + ry^2$

Step 6: Calculate the decision parameter for Region 2

$p2 = ry^2(x + 0.5)^2 + rx^2(y - 1)^2 - rx^2ry^2$

Step 7: Region 2 processing (slope ≤ -1)

Repeat while $y \geq 0$

a) Plot the symmetric points

b) If $p2 > 0$

$y = y - 1$

$dy = dy - 2 \times rx^2$

$p2 = p2 + rx^2 - dy$

c) Else

$y = y - 1$

$x = x + 1$

$dx = dx + 2 \times ry^2$

$dy = dy - 2 \times rx^2$

$p2 = p2 + dx - dy + rx^2$

Step 8: Stop the algorithm.