Midpoint Ellipse Drawing Algorithm

Step 1: Start

Step 2: Input the center coordinates and radius of the ellipse

(x_c, y_c), r_x, r_y

Step 3: Initialize the starting point

$x = 0$

$y = r_y$

Step 4: Calculate the initial decision parameter for R1

$p1 = r_y^2 - (r_x^2 \times r_y) + (1/4 \times r_x^2)$

Step 5: Calculate initial values

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

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

Step6: Region 1 (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 7: Calculate the decision parameter for R2

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

Step 8: Region 2 (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 9: Stop.