In the Mathematica Worksheet Conics.nb or the online Geogebra visualization at GMM: Graphs in Polar Coordinates or GCF: Graphs in Polar Coordinates, you will examine a three parameter family of curves described by the polar equation

$$r(\phi) = \frac{\alpha}{1 + \epsilon \cos(\phi + \delta)}.$$

Describe in detail how the shape of the plot depends on the parameters α, δ, and ϵ. Pay particular attention to different values of ϵ.

Solution

- α adjusts the scale of the orbit
- ϵ, the eccentricity, adjusts the shape of the orbit.

$\epsilon = 0$	circle
$0 < \epsilon < 1$	ellipse
$\epsilon = 1$	parabola
$\epsilon > 1$	hyperbola

- δ the phase shift adjusts the rotation of the major axis of the conic.