ECCENTRI.8xp

Program Description by Aaron Cao

Fundamentally, all conics have a fixed ratio between a point called a focus and a line called a directrix. Though the focus and directrix differ in location from conic to conic, the ratio between them is known as the eccentricity. This program finds the eccentricity of any conic function.

We begin by making a table of all of the conic sections for selection: Parabola, Circle, Ellipse, and Hyperbola. All circles have an eccentricity of 0, so when the user selects the circle in the table, the program will display $e = 0.$ Similarly, all parabolas have an eccentricity of 1, so the program will display $e = 1$ when selected.

The ellipse and hyperbola are a bit trickier. For an ellipse of the form:

$$\frac{X^2}{A^2} + \frac{Y^2}{B^2} = 1$$

The eccentricity is dependent on the values of A and B, or the lengths of the major and minor axis respectively. Our eccentricity for an ellipse is

$$\frac{\sqrt{A^2 - B^2}}{A}$$

Where $\sqrt{A^2 - B^2}$ is known as our value C.

Similarly, for a hyperbola of the form: $\frac{X^2}{A^2} - \frac{Y^2}{B^2} = 1$

Our eccentricity is: $\frac{\sqrt{A^2 + B^2}}{A}$

With $\sqrt{A^2 + B^2}$ as our C value.

With this, the program can display the eccentricity of any conic.