Conic Equations

UVU Math Lab

Colin Brinkerhoff Method

Parabola:

Vertex: (h, k) $p = \frac{1}{4a}$ $a = \frac{1}{4p}$

Case 1:	Case 2:
$y = a(x-h)^2 + k$	$x = a(y-k)^2 + h$
Axis of symmetry: vertical, $x = h$	Axis of symmetry: vertical, $y = k$
Focus: $(h, k+p)$	Focus: $(h+p, k)$
Directrix: $y = k - p$	Directrix: $x = h - p$

Ellipse:

$\frac{(x-h)^2}{a^2} + \frac{(y-k)^2}{b^2} = 1$ Center (h, k)

Case 1:	Case 2:
$a > b$	$b > a$
$a^2 = b^2 + c^2$	$b^2 = a^2 + c^2$
Major axis: horizontal, $y = k$	Major axis: vertical: $x = h$
Major vertices: $(h \pm a, k)$	Major vertices: $(h, k \pm b)$
Foci: $(h \pm c, k)$	Foci: $(h, k \pm c)$

Hyperbola:

Center: (h, k) $c^2 = a^2 + b^2$ Asymptotes: $y = \pm\frac{b}{a}(x-h) + k$

Case 1:	Case 2:
$\frac{(x-h)^2}{a^2} - \frac{(y-k)^2}{b^2} = 1$	$-\frac{(x-h)^2}{a^2} + \frac{(y-k)^2}{b^2} = 1$
Major axis: horizontal, $y = k$	Major axis: vertical, $x = h$
Major vertices: $(h \pm a, k)$	Major vertices: $(h, k \pm b)$
Foci: $(h \pm c, k)$	Foci: $(h, k \pm c)$