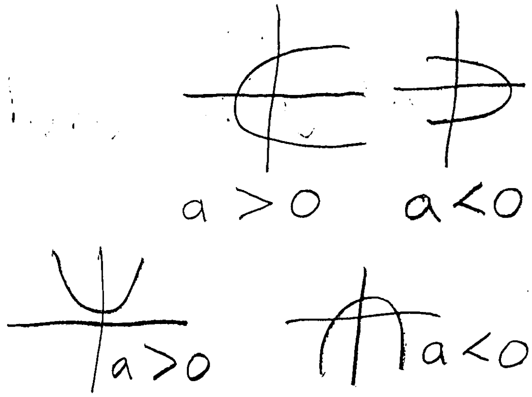
Conics

- Parabola

$$(y-k)^2 = 4a(x-h)$$

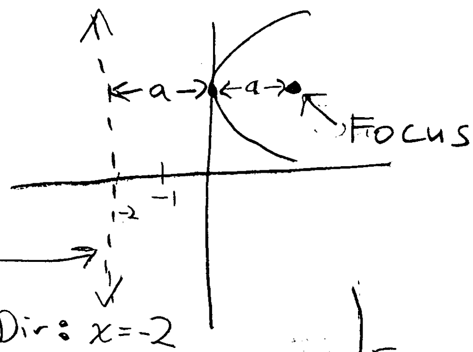
$$(x-h)^2 = 4a(y-k)$$



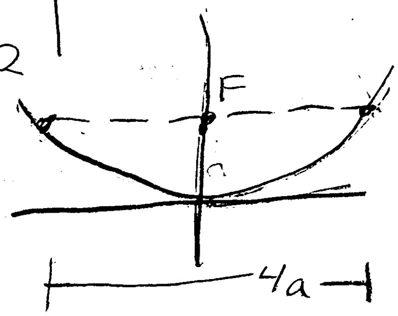
Vertex - $V(h,k)$

Focal distance $= a$

Directrix is "a" units
from the vertex.



4a - distance through
the focus



- Circle

$$(x-h)^2 + (y-k)^2 = r^2$$

Center - (h,k)

Radius - r

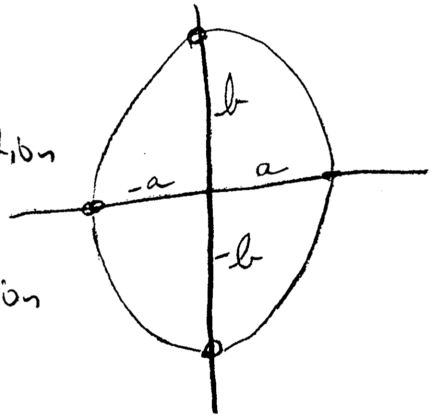
Conics (Conti)

- Ellipse

$$\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$$

Graph "a" units in the x direction

Graph "b" units in the y direction



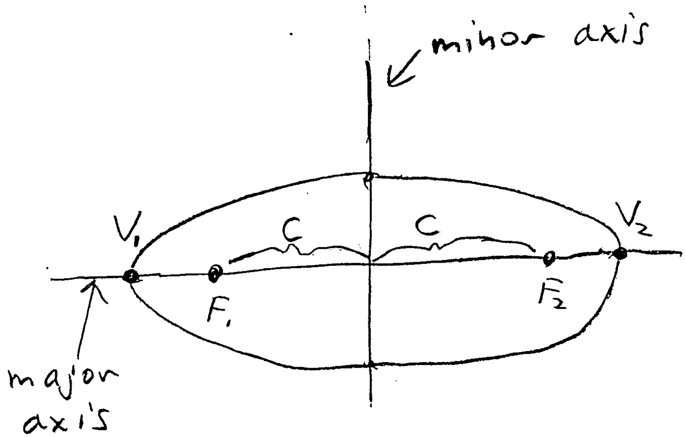
$c^2 = a^2 - b^2$

or $c^2 = b^2 - a^2$

Larger number goes first.

c is the focal length.

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



Center - (h, k)

Foci are always in the long direction, meaning on the major axis.

Vertices are on the major axis. (See V_1 & V_2)

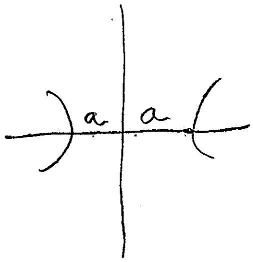
Length of the major axis is the distance from V_1 to V_2.

Sum of focal radii is the distance from V_1 to V_2.

Conics (Cont.)

- Hyperbola

$$\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$$

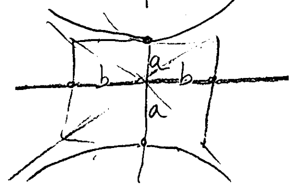


If x^2 term is first, graph cuts through the x-axis.

$$c^2 = a^2 + b^2$$

c is the focal length

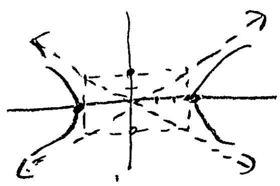
$$\frac{y^2}{a^2} - \frac{x^2}{b^2} = 1$$



If y^2 term is first, graph cuts through the y-axis.

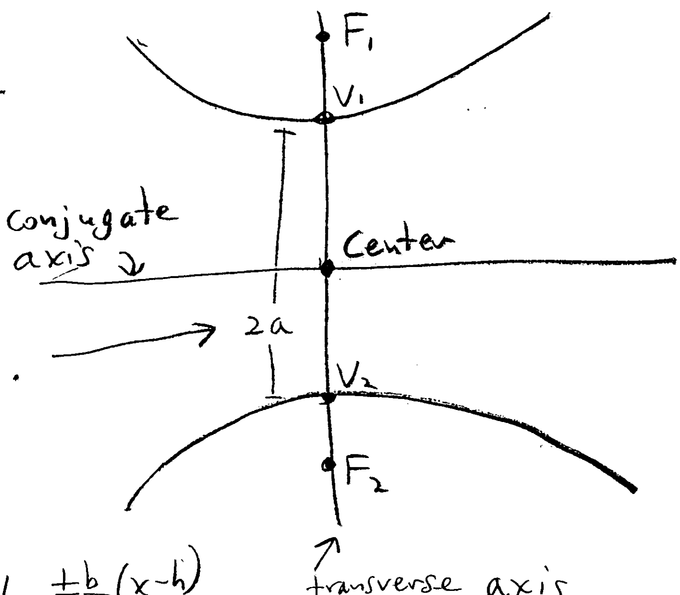
Asymptotes

$$y = \pm \frac{b}{a} x$$



where "b" is change in y and "a" is change in x

Difference of focal radii is $2a$.



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

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

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

change in y

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

change in x