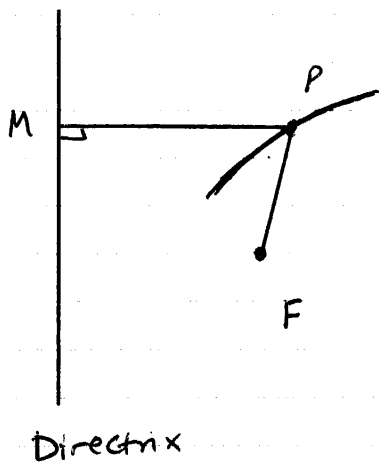


CONIC SECTIONS



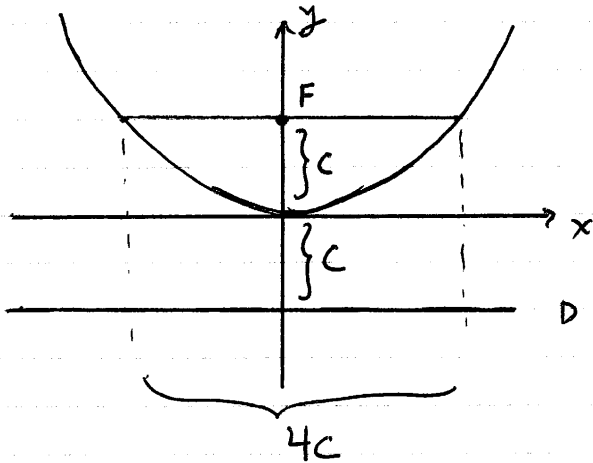
$$\frac{|PF|}{|PM|} = e \text{ for all points}$$

$e < 1$ ellipse

$e = 1$ parabola

$e > 1$ hyperbola

PARABOLA

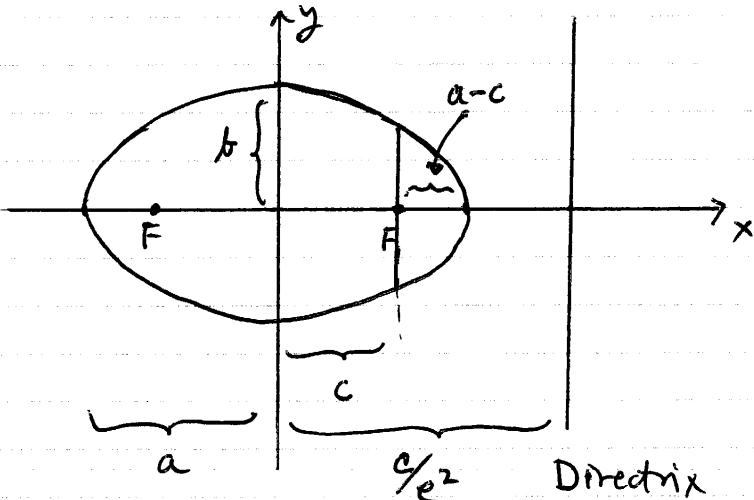


$$y = \frac{1}{4c} x^2$$

$$l.r. = 4c$$

"latus" = side
"rectum" = straight

ELLIPSE



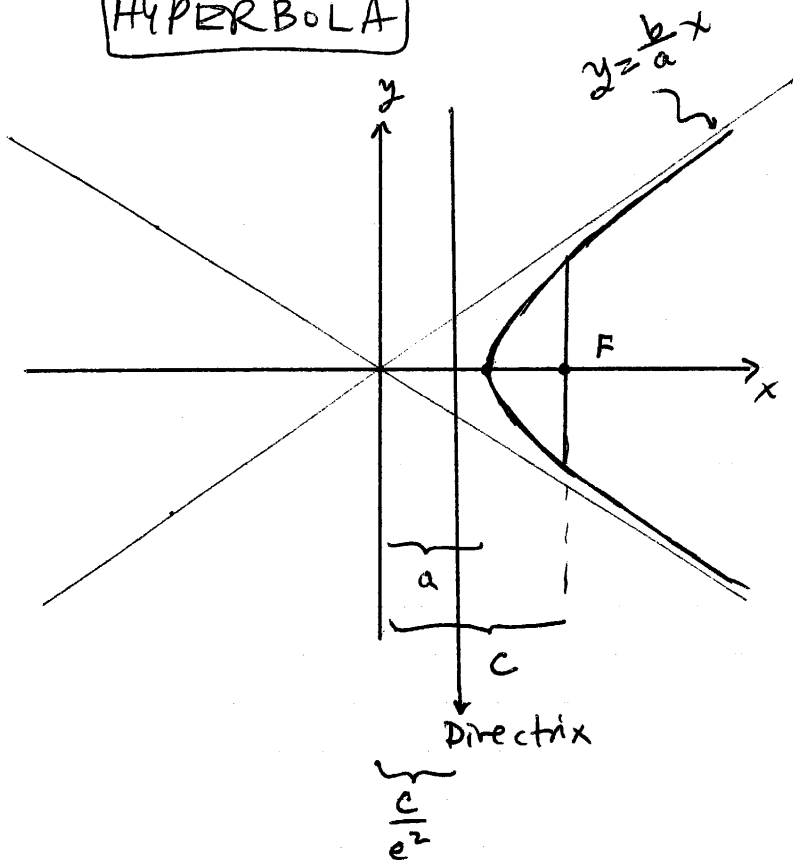
$$\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$$

$$a^2 = b^2 + c^2 \quad a = \frac{c}{e}$$

$$b^2 = \frac{c^2}{e^2} (1 - e^2)$$

$$l.r. = 2a = 2 \frac{b^2}{a}$$

HYPERBOLA



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

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

$$\text{l.r.} = \frac{2b^2}{a}$$

$$a = \frac{c}{e} \quad b^2 = \frac{c^2}{e^2} (e^2 - 1)$$

DEGENERATE CONICS

line, Two lines intersecting, point

eg: $x^2 + 2y^2 = 0 \Rightarrow \text{point}$

$x^2 + 2y^2 + 1 = 0 \Rightarrow \text{empty}$

GENERAL

$$Ax^2 + Bxy + Cy^2 + Dx + Ey + F = 0$$

$B^2 - 4AC > 0$ hyperbola

< 0 ellipse

$= 0$ parabola

"assuming the conic is not degenerate"