§ 6.9 Conic Sections in Polar coordinates

$$r = \frac{ep}{1 \pm e\sin\theta}$$

Directrix above the pole $+$
Directrix below the pole $-$

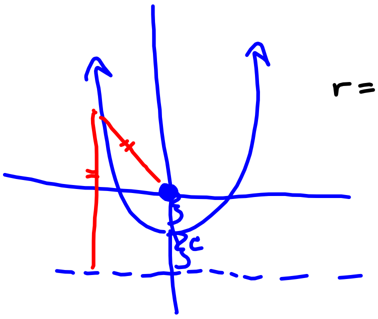
$$r = \frac{ep}{1 \pm e\cos\theta}$$

Directrix to the right of the pole $+$
" " " left of " " $-$

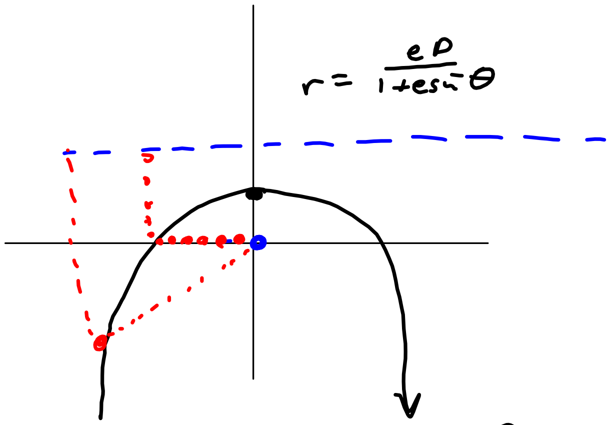
Focus is at the pole.

Parabolas $e = 1 = \frac{c}{a} = \frac{\text{distance from vertex to focus}}{\text{distance from vertex to directrix}}$

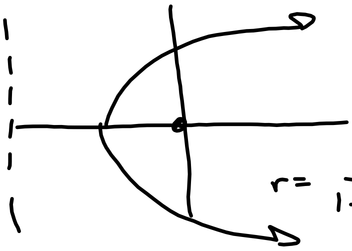
$=$ ECCENTRICITY.



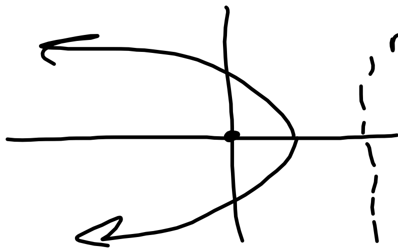
$$r = \frac{ep}{1 - e\sin\theta}$$



$$r = \frac{ep}{1 + e\sin\theta}$$



$$r = \frac{ep}{1 - e\cos\theta}$$



$$r = \frac{ep}{1 + e\cos\theta}$$

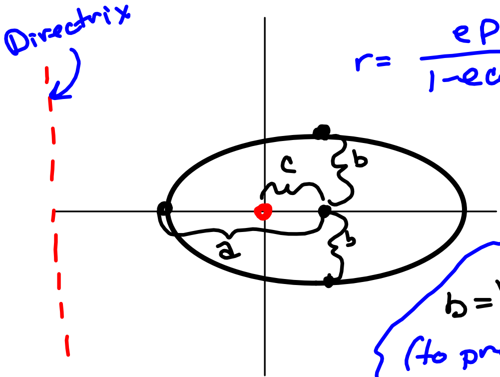
Ellipses

$e = \frac{c}{a} = \frac{\text{Dist from center to focus}}{\text{" \quad " \quad " \quad " \quad vertex}}$

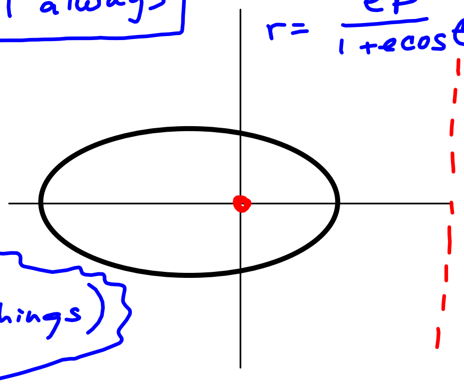
$\boxed{e < 1 \text{ always}}$

Directrix

$r = \frac{ep}{1-e\cos\theta}$

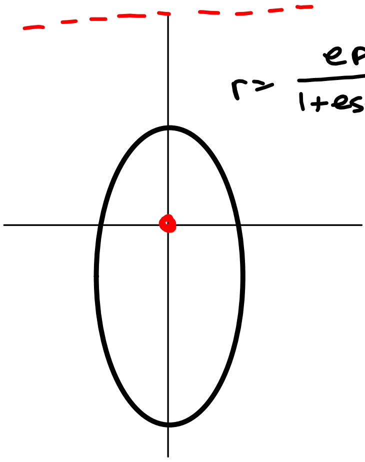


$r = \frac{ep}{1+e\cos\theta}$

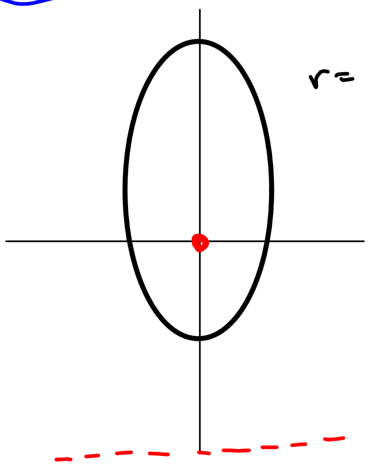


$b = \sqrt{a^2 - c^2}$
(to pretty-up things)

$r = \frac{ep}{1+e\sin\theta}$



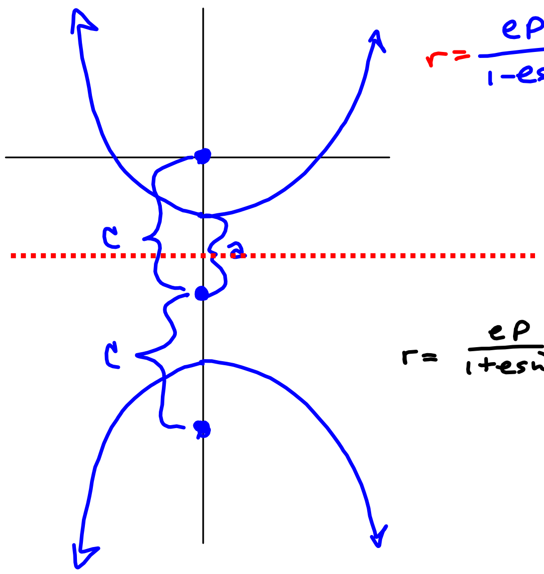
$r = \frac{ep}{1-e\cos\theta}$



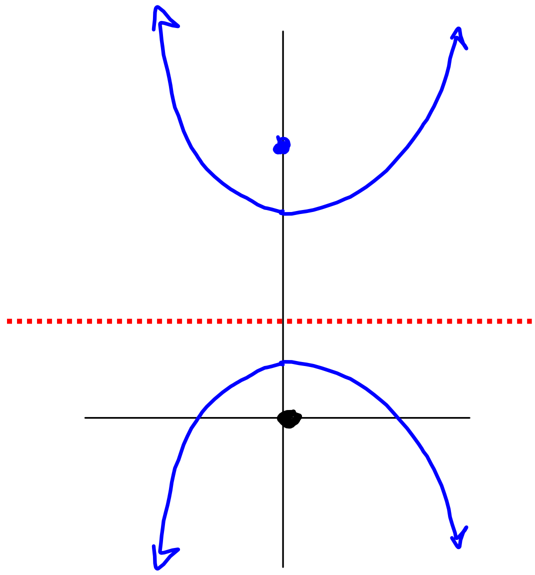
Hyperbolas

$e = \frac{c}{a} > 1$ (Because $c > a$!)

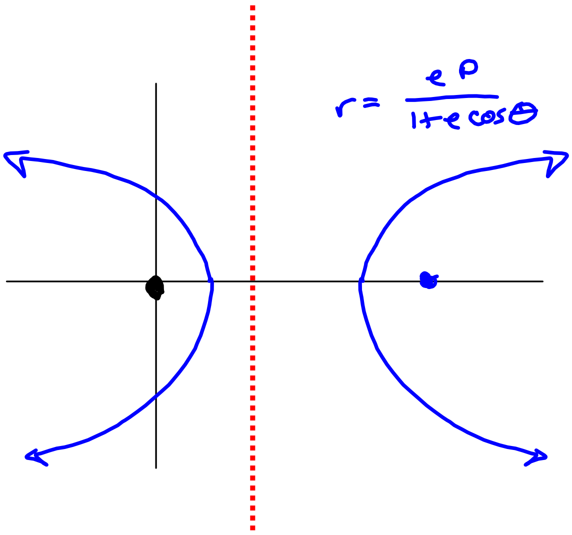
$r = \frac{ep}{1 - e\sin\theta}$



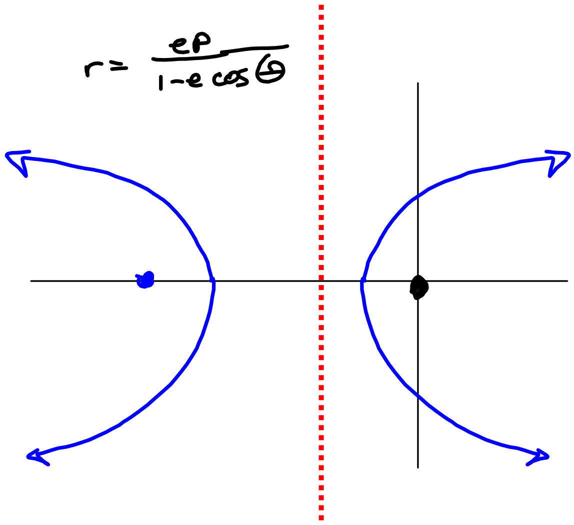
$r = \frac{ep}{1 + e\sin\theta}$



$r = \frac{ep}{1 + e\cos\theta}$



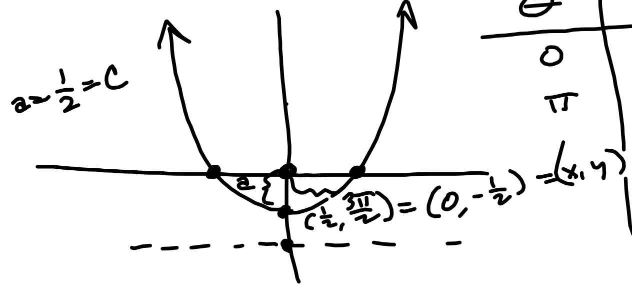
$r = \frac{ep}{1 - e\cos\theta}$



Hand-sketch ?

$\frac{-1}{1-\sin\theta}$ I can graph $\frac{1}{1-\sin\theta}$

$\theta = 0 \rightarrow r = 1$,



θ	r
0	1
π	1

$e = 1 \rightarrow$

$(ep = 1 \rightarrow$
$p = 1)$

To graph $\frac{-1}{1-\sin\theta}$, just reflect through the focus (pole)