

Geometria Analítica

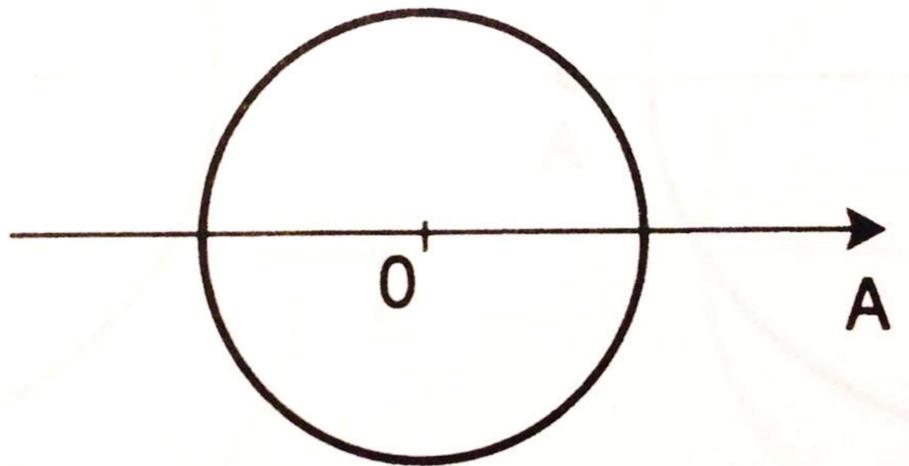
Coordenadas polares

Prof. Dr. Lucas Barboza Sarno da Silva

Circunferências

Circunferência centrada no pólo e raio c

$$r = c, \quad c \in \mathbb{R}$$

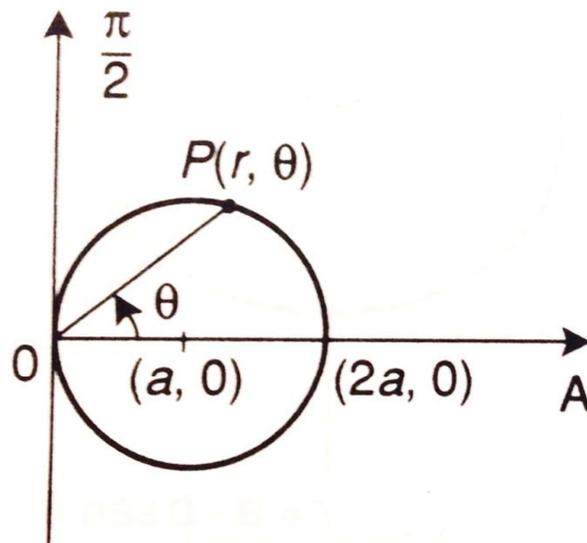


Circunferências

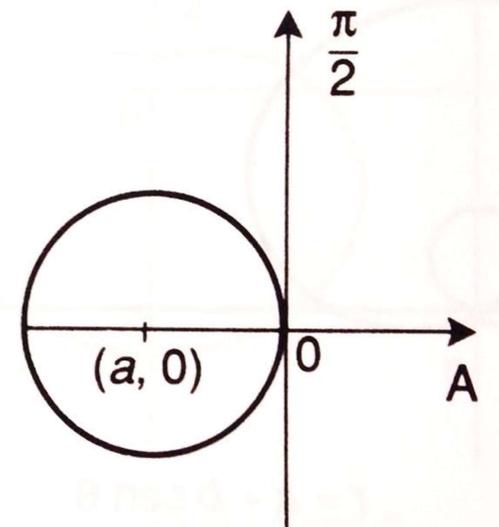
$$r = 2a \cos \theta$$

Circunferência de centro no eixo polar, tangente ao eixo $\theta = \pi/2$

- Se $a > 0$, o gráfico está à direita do pólo
- Se $a < 0$, o gráfico está a esquerda do pólo



$$[r = 2a \cos \theta, a > 0]$$



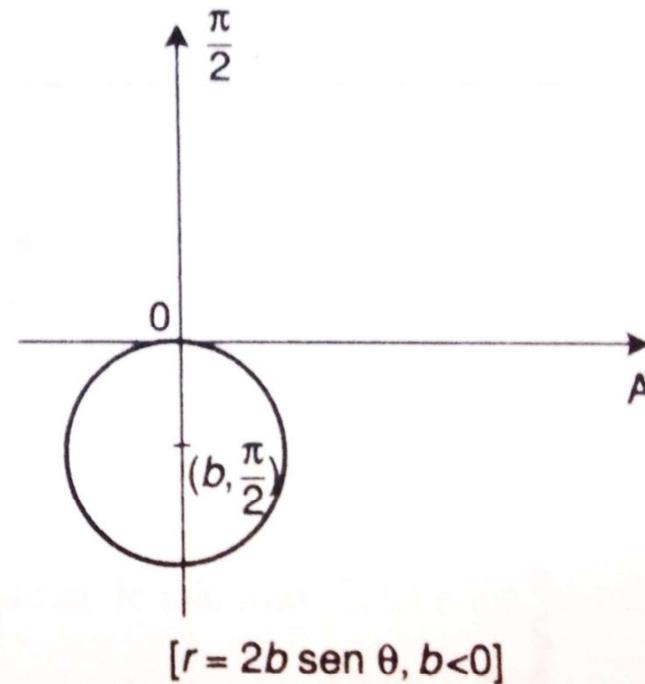
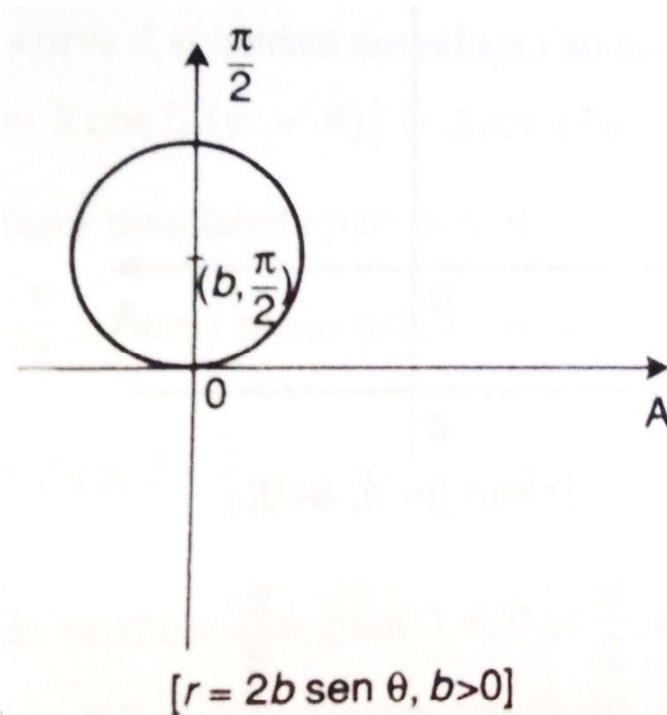
$$[r = 2a \cos \theta, a < 0]$$

Circunferências

$$r = 2b \operatorname{sen}\theta$$

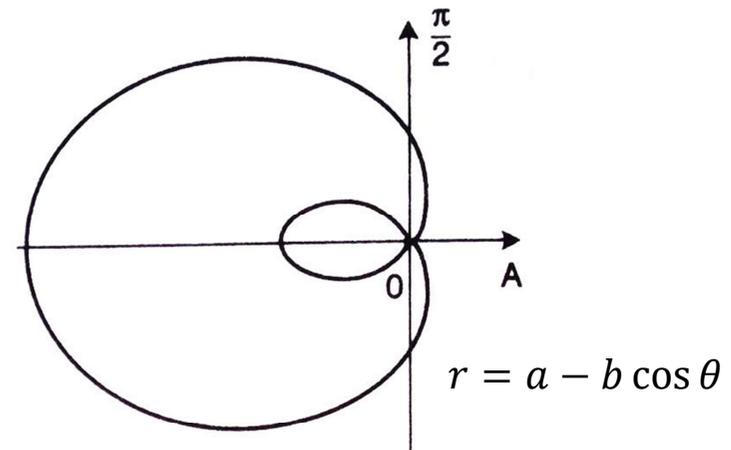
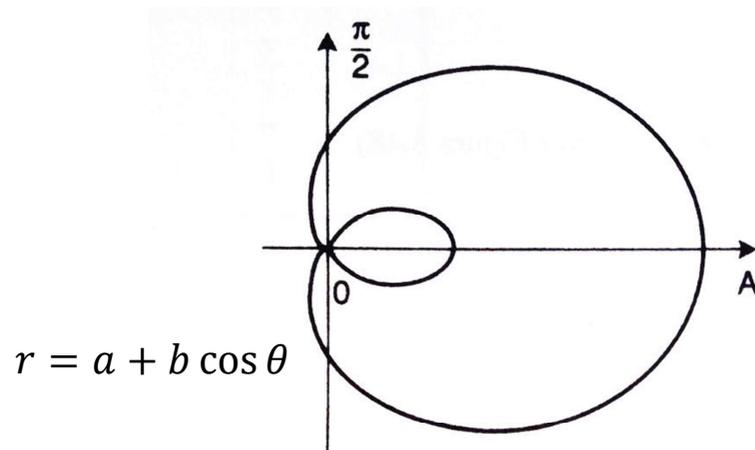
Circunferência de centro no eixo $\pi/2$ e tangente ao eixo polar

- Se $b > 0$, o gráfico está acima do pólo
- Se $b < 0$, o gráfico está abaixo do pólo

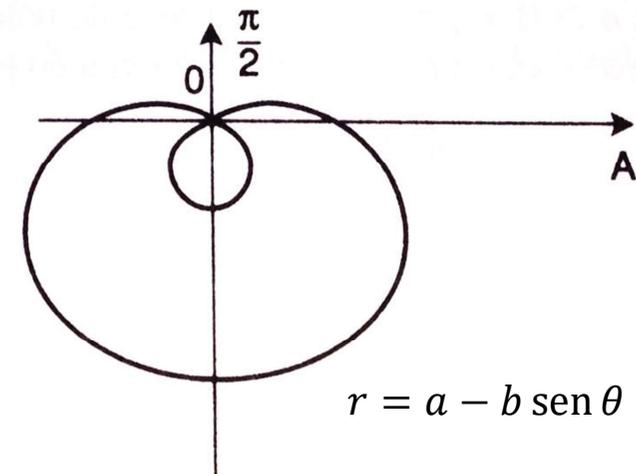
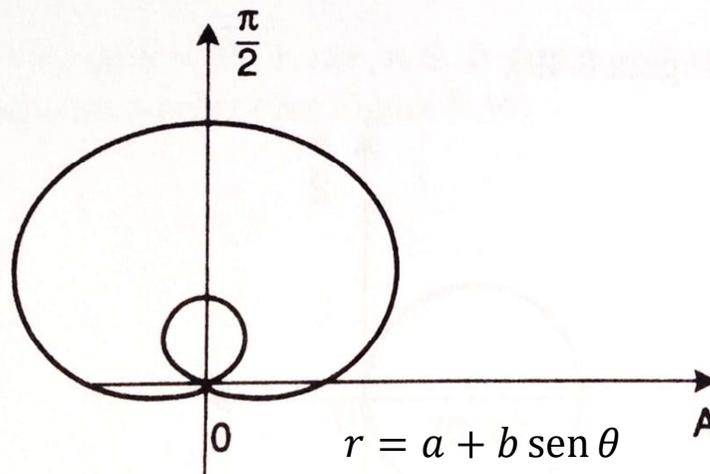


Limaçons

→ $r = a \pm b \cos \theta$ $a, b \in \mathbb{R}; b > a$

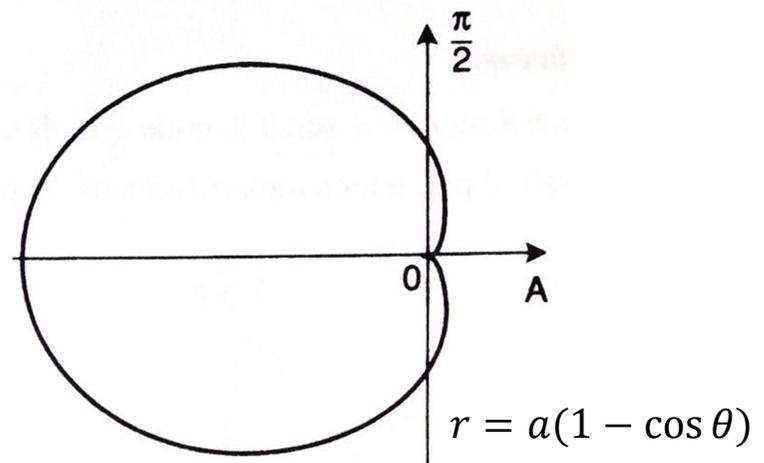
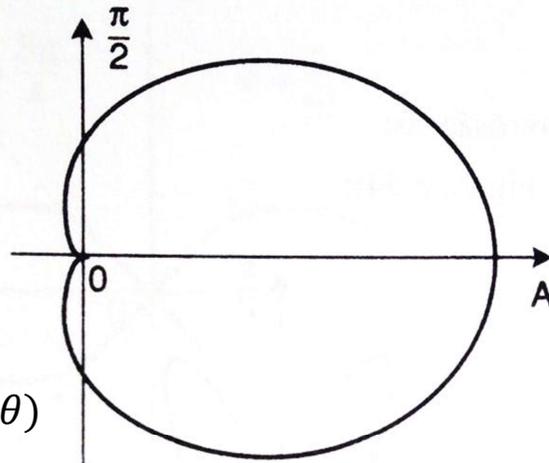


→ $r = a \pm b \sin \theta$ $a, b \in \mathbb{R}; b > a$

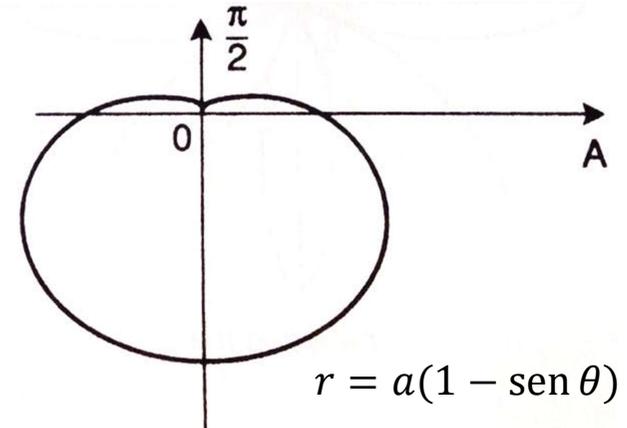
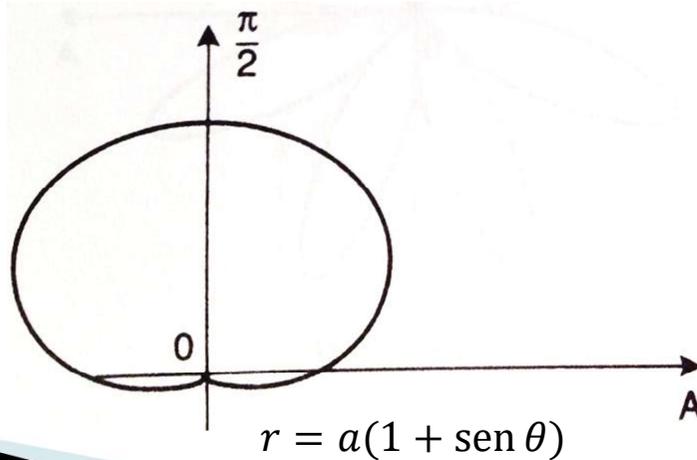


Limaçon (cardióide)

→ $r = a \pm b \cos \theta$ $a, b \in \mathbb{R}; b = a$

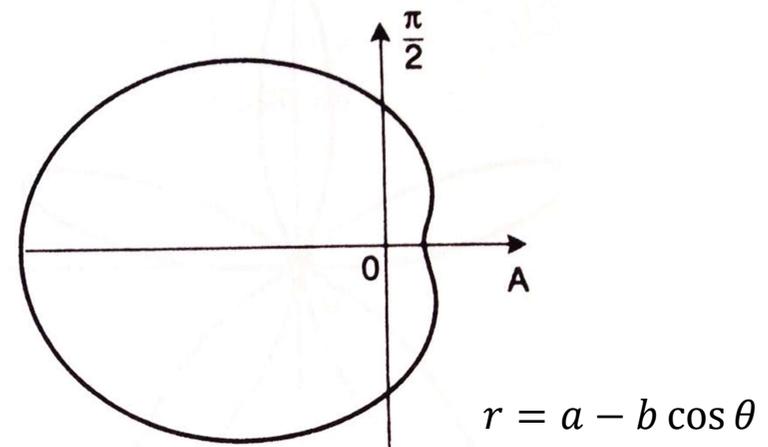
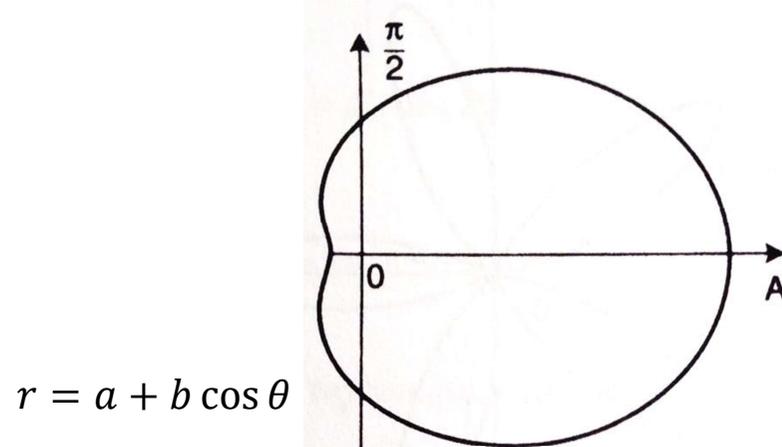


→ $r = a \pm b \sin \theta$ $a, b \in \mathbb{R}; b = a$

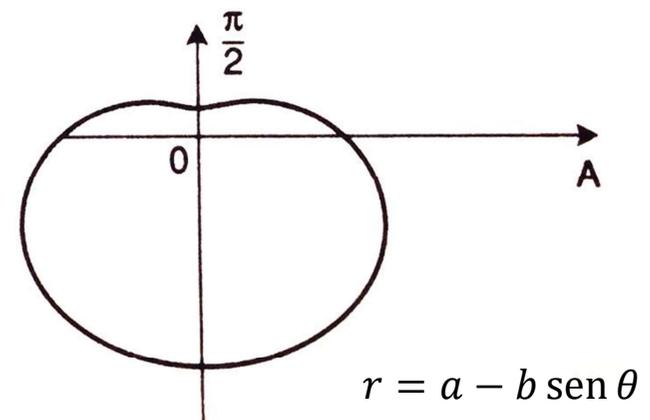
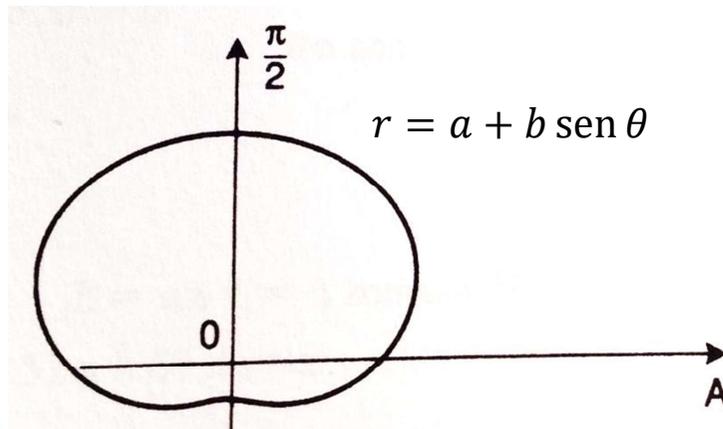


Limaçons

→ $r = a \pm b \cos \theta$ $a, b \in \mathbb{R}; b < a$



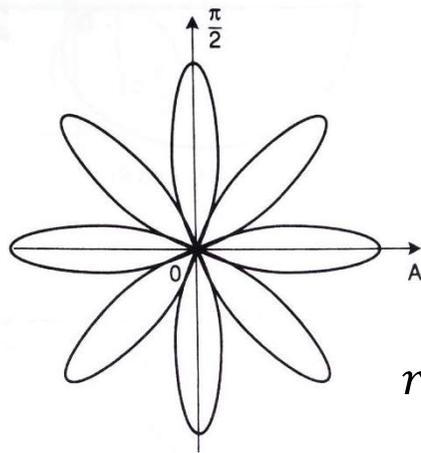
→ $r = a \pm b \sin \theta$ $a, b \in \mathbb{R}; b < a$



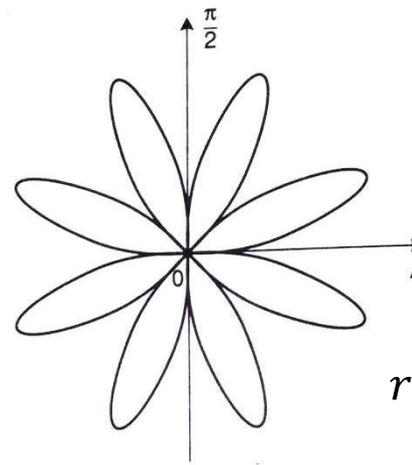
Rosáceas

$$r = a \cos n\theta \quad \text{ou} \quad r = a \sin n\theta \quad a \in \mathbb{R}; n \in \mathbb{N}$$

- Se n é par, temos uma rosácea de $2n$ pétalas

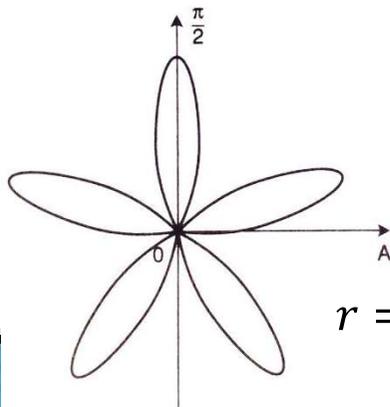


$$r = a \cos n\theta$$

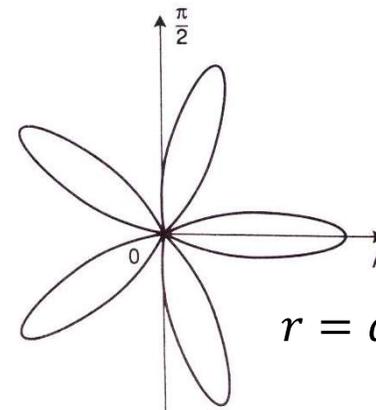


$$r = a \sin n\theta$$

- Se n é ímpar, temos uma rosácea de n pétalas



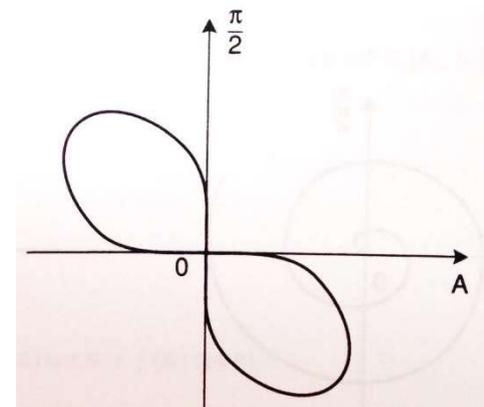
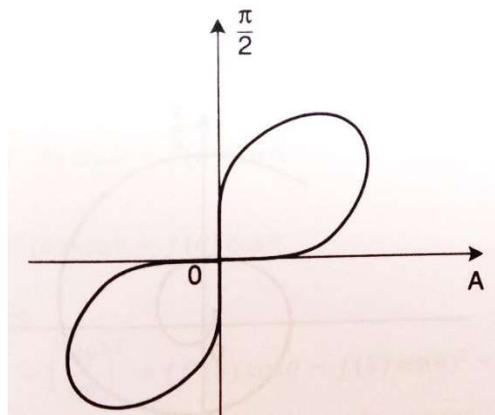
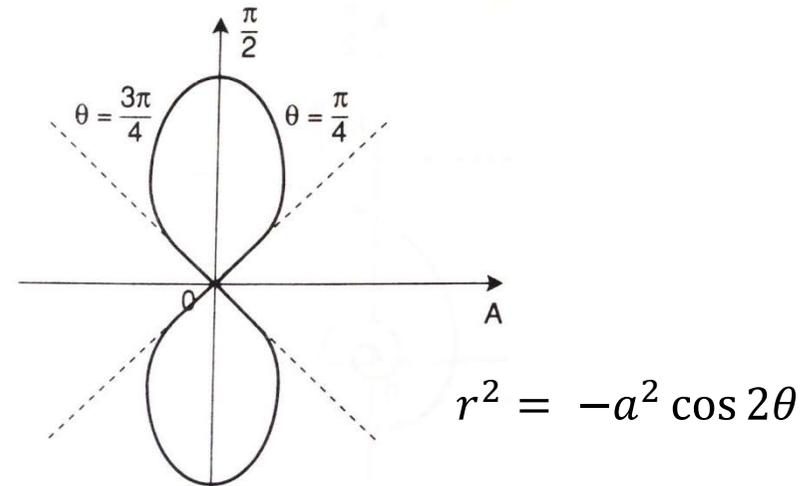
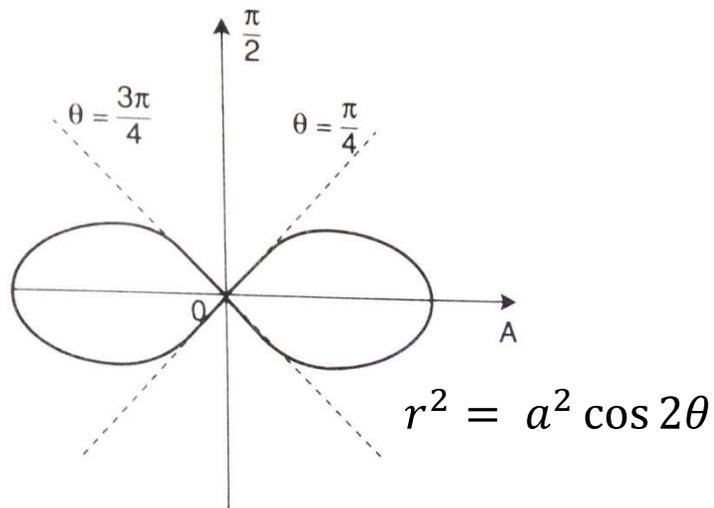
$$r = a \sin n\theta$$



$$r = a \cos n\theta$$

Lemniscatas

$$r^2 = \pm a^2 \cos 2\theta \quad \text{ou} \quad r^2 = \pm a^2 \sin 2\theta \quad a \in \mathbb{R}$$

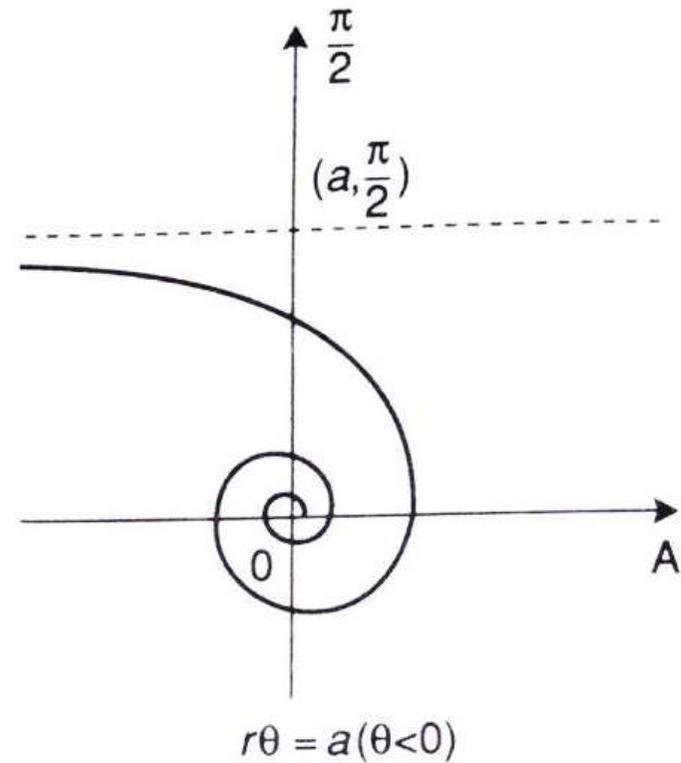
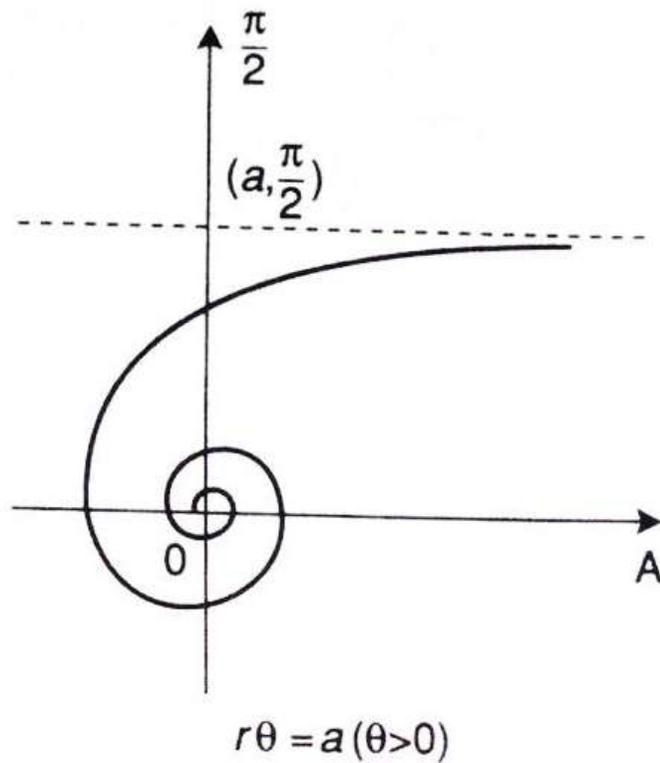


$$r^2 = a^2 \sin 2\theta$$

$$r^2 = -a^2 \sin 2\theta$$

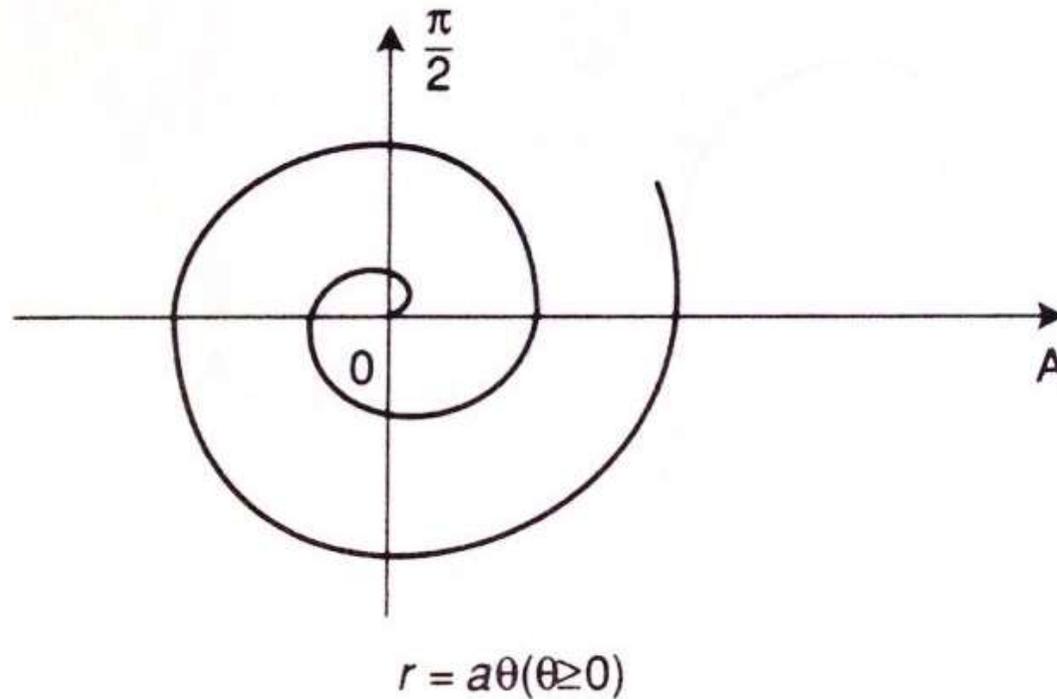
Espirais

Espiral hiperbólica: $r\theta = a, a > 0$



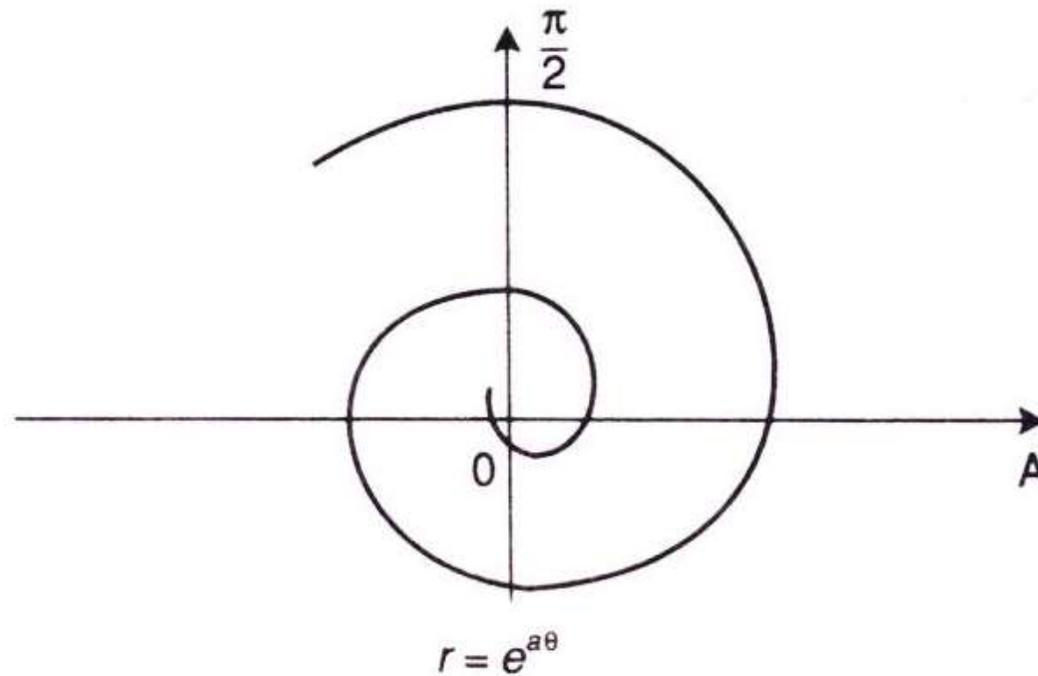
Espirais

Espiral de Arquimedes: $r = a\theta, a > 0$



Espirais

Espiral logarítmica: $r = e^{a\theta}$



Espirais

Espiral parabólica: $r^2 = \theta$

