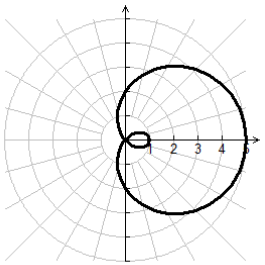
Polar Graph Notes

Limaçons

$r = a \pm b\cos\theta$

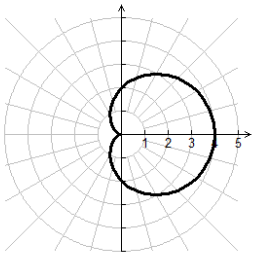
$r = a \pm b\sin\theta$

$a > 0, b > 0$



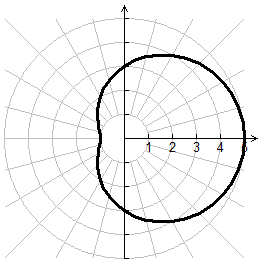
$a < b$

looped



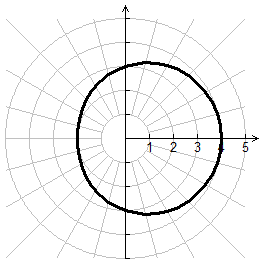
$a = b$

cardioid



$1 < \frac{a}{b} < 2$

dimpled



$\frac{a}{b} \geq 2$

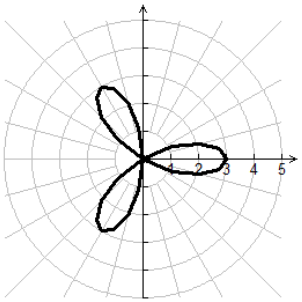
convex

Rose Curves

n petals if n is odd

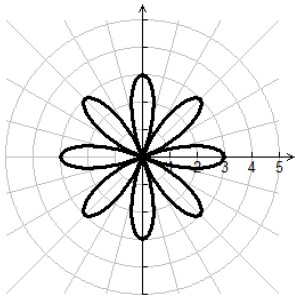
2n petals if n is even

$n \geq 2$



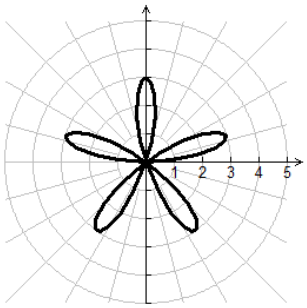
$r = a\cos n\theta$

n = 3



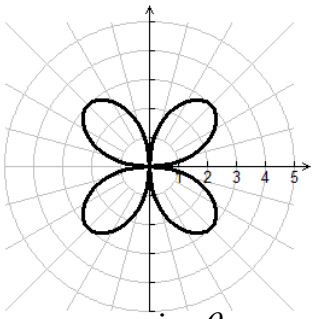
$r = a\cos n\theta$

n = 4



$r = a\sin n\theta$

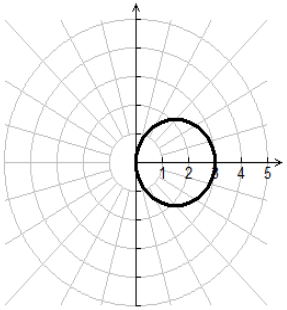
n = 5



$r = a\sin n\theta$

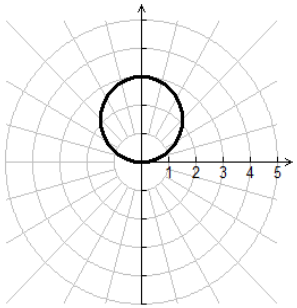
n = 2

Circles and Lemniscates



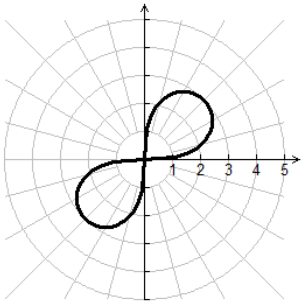
$r = a\cos\theta$

circle



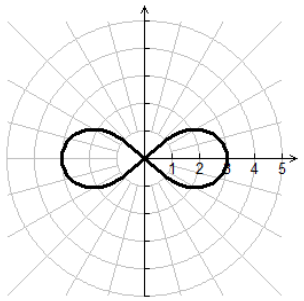
$r = a\sin\theta$

circle



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

lemniscate

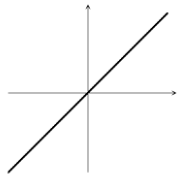


$r^2 = a^2\cos 2\theta$

lemniscate

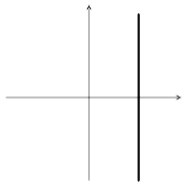
Line passing through the origin of slope $\tan\alpha$

$$\theta = \alpha$$



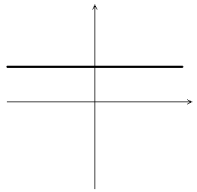
Vertical Line

$$r = \frac{a}{\cos\theta}$$



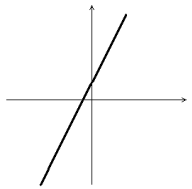
Horizontal Line

$$r = \frac{b}{\sin\theta}$$



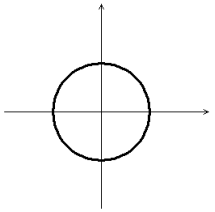
General Line

$$r = \frac{c}{a\cos\theta + b\sin\theta}$$



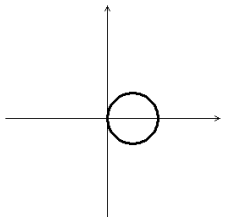
Circle, center at the origin

$$r = a, \quad a > 0$$



Circle, tangent to the line $\theta = \frac{\pi}{2}$, center on the polar axis

$$r = a\cos\theta, \quad a > 0$$



Circle, tangent to polar axis, center on the line $\theta = \frac{\pi}{2}$

$$r = a\sin\theta, \quad a > 0$$