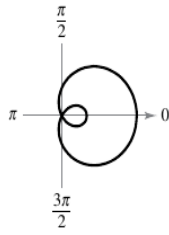


### Limaçons

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

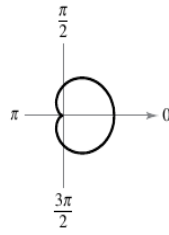
$$r = a \pm b \sin \theta$$

$$(a > 0, b > 0)$$



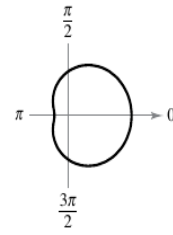
$$\frac{a}{b} < 1$$

Limaçon with  
inner loop



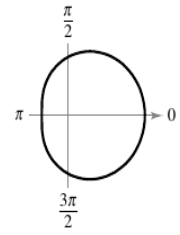
$$\frac{a}{b} = 1$$

Cardioid  
(heart-shaped)



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

Dimpled limaçon



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

Convex limaçon

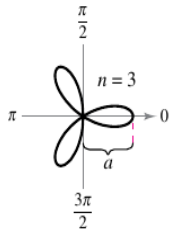
### Rose Curves

$n$  petals when  $n$  is odd

$2n$  petals when  $n$  is even

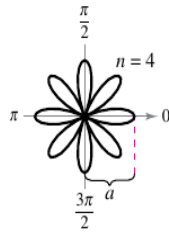
even

$$(n \geq 2)$$



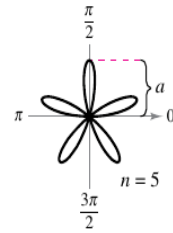
$$r = a \cos n\theta$$

Rose curve



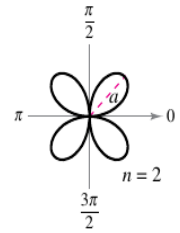
$$r = a \cos n\theta$$

Rose curve



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

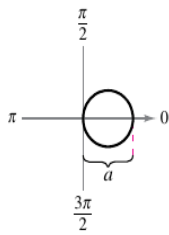
Rose curve



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

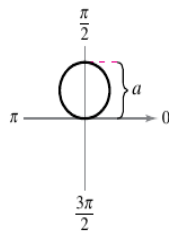
Rose curve

### Circles and Lemniscates



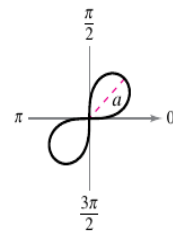
$$r = a \cos \theta$$

Circle



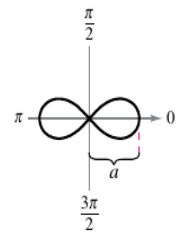
$$r = a \sin \theta$$

Circle



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

Lemniscate



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

Lemniscate