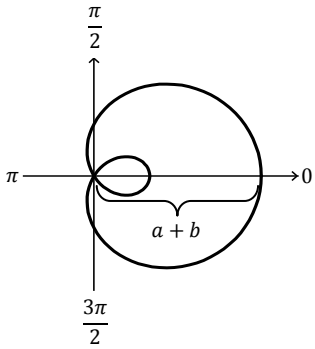
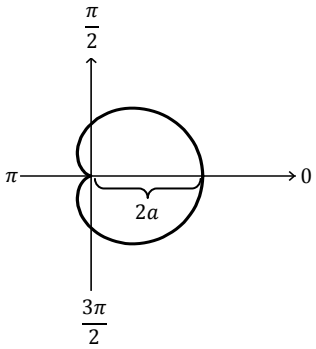
Special Polar Graphs

Limaçons: (positive cosine orientation) period = 2π $r = a \pm b\cos(\theta)$ $r = a \pm b\sin(\theta)$ $(a > 0, b > 0)$



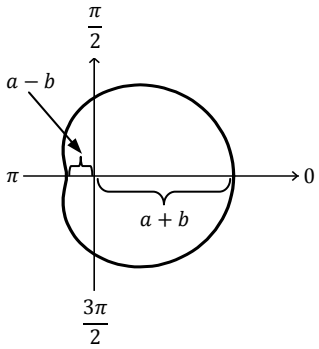
$\frac{a}{b} < 1$

Limaçon with inner loop



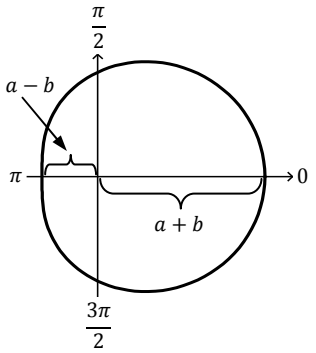
$\frac{a}{b} = 1$

Cardioid (heart-shaped)



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

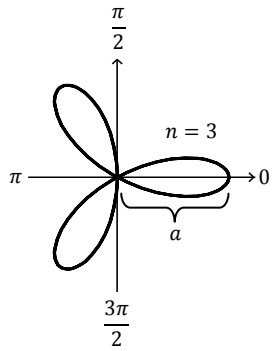
Dimpled limaçon



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

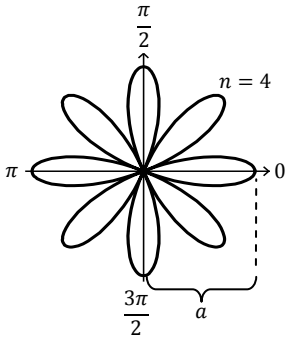
Convex limaçon

Rose Curves: *n* petals if *n* is odd (period = π); 2*n* petals if *n* is even (*n* ≥ 2 and period = 2π)



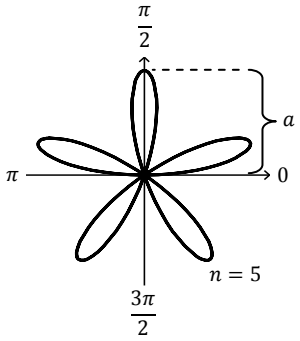
$r = a\cos(n\theta)$

Rose curve



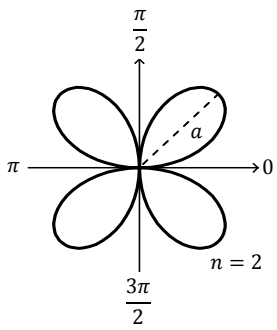
$r = a\cos(n\theta)$

Rose curve



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

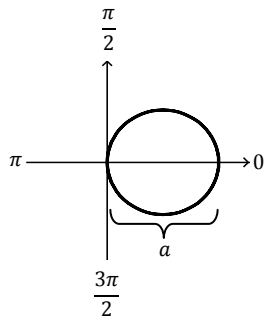
Rose curve



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

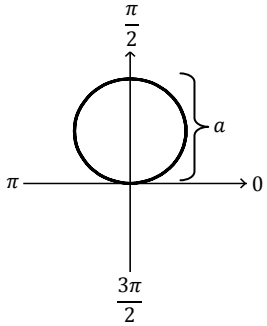
Rose curve

Circles and Lemniscates: period = π



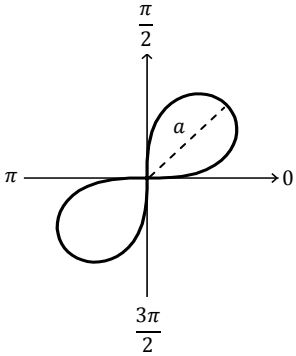
$r = a\cos(\theta)$

Circle



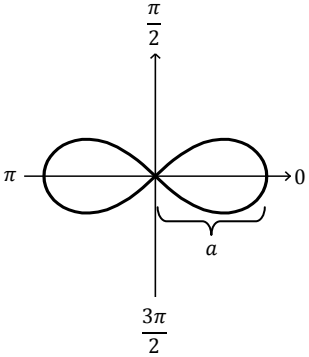
$r = a\sin(\theta)$

Circle



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

Lemniscate



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

Lemniscate

Department of Mathematics, Sinclair Community College, Dayton, OH
(recreated and modified from page 735 in *Calculus 8th edition* by Larson, Hostetler, Edwards)