6.5 Graphs of Polar Equations

Obj: 1. Graph polar equations
2. Analyze graphs.

Symmetry: over x-axis
over y-axis
over the origin

Mar 1-9:47 AM

Symmetry Tests

over x axis: replace (r,θ) with $(r,-\theta)$ or $(-r,\pi-\theta)$

over y-axis: replace (r,θ) with $(-r,-\theta)$ or $(r,\pi-\theta)$

over origin: replace (r,θ) with $(-r,\theta)$ or $(r,\theta+\pi)$

Mar 1-9:50 AM

Prove $r = 4\sin 3\theta$ is symm. over the y-axis.

replace (r,θ) with $(-r,-\theta)$ or $(r,\pi-\theta)$

$-r = 4\sin 3(-\theta)$

$-r = 4\sin(-3\theta)$

$\sin(-x) = -\sin x$

$-r = 4(-\sin 3\theta)$

$-r = -4\sin 3\theta$

$r = 4\sin 3\theta$

Mar 1-9:54 AM

Prove $r = 1+2\cos\theta$ is symm. over x-axis.

$(r,\theta) \rightarrow (r,-\theta)$

$r = 1+2\cos(-\theta)$

$\cos(-x) = \cos x$

✓ $r = 1+2\cos\theta$

Mar 1-9:57 AM

Rose Curves

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

Symm: * If n is even then it is symm. over x-axis, y-axis & origin.

* If n is odd then:
  $r = a\cos n\theta$ symm. over x-axis
  $r = a\sin n\theta$ symm over y-axis

# of petals: If n is odd: n petals
If n is even: $2n$ petals

$r = 4\sin 3\theta$
Symm over y-axis
3 petals

Mar 1-10:00 AM

Range: $[-|a|, |a|]$

$r = 4\sin 3\theta$
$R: [-4, 4]$
length of petal

Analyze: $r = 3\sin 4\theta$
Symm: over x-axis, y-axis, origin
8 petals of length: 3
Range: $[-3, 3]$
Domain: $(-\infty, \infty)$

Mar 1-10:06 AM

Analyze: $r = 5\cos 3\theta$

Symm: over x-axis

3 petals of length 5

R: $[-5, 5]$

D: $(-\infty, \infty)$

Mar 1-10:10 AM

Limaçon Curves:

"Lee ma sohn" curves

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

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

Symm: $r = a \pm b\sin\theta$: over y-axis

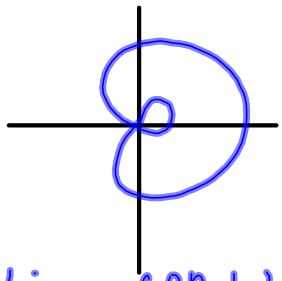
$r = a \pm b\cos\theta$: over x-axis

D: $(-\infty, \infty)$

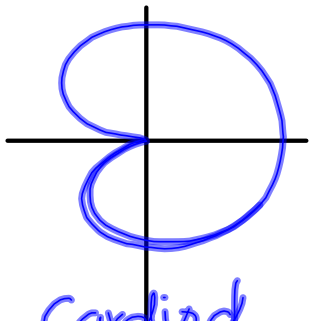
R: $[a-b, a+b]$

Mar 1-10:15 AM

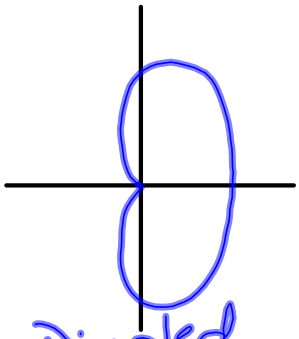
Type



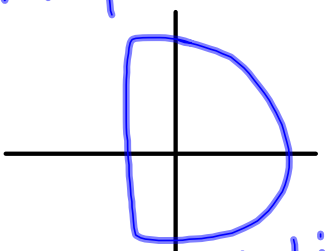
Limaçon w/ inner loop



Cardiod



Dimpled Limaçon



Convex Limaçon

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Analyze: $r = \underset{a}{3} - \underset{b}{2}\sin\theta$

Symm: y-axis

D: $(-\infty, \infty)$

R: $[1, 5]$

Type: convex

Mar 1-10:22 AM