

8.2 - Graphing Polar Equations (Day #2)

Ex. 8 Graph $r = 1 - \sin \theta$ (CARDIOID)

① Check for symmetry

a.) Polar axis: $r = 1 - \sin(-\theta) \rightarrow r = 1 + \sin \theta$ No

b.) Line $\theta = \frac{\pi}{2}$: $r = 1 - \sin(\pi - \theta)$

$$1 - [\sin \pi \cos \theta - \cos \pi \sin \theta] = 1 - \sin \theta \text{ Yes}$$

c.) The pole: $(-r) = \frac{1 - \sin \theta}{-1} \rightarrow r = -1 + \sin \theta$ No

* Due to symmetry w/ respect to $\theta = \frac{\pi}{2}$, we only need to assign values to θ from $-\frac{\pi}{2}$ to $\frac{\pi}{2}$

② make a table

θ	$r = 1 - \sin \theta$
$-\pi/2$	$1 - (-1) = 2$
$-\pi/3$	$1 - (-\frac{\sqrt{3}}{2}) = 1.87$
$-\pi/6$	$1 - (-\frac{1}{2}) = 3/2$
0	$1 - 0 = 1$
$\pi/6$	$1 - \frac{1}{2} = 1/2$
$\pi/3$	$1 - \frac{\sqrt{3}}{2} = 0.13$
$\pi/2$	$1 - 1 = 0$

Ex. 9 - Graph $r = 3 + 2 \cos \theta$ (limacon without inner loop)

a.) Polar axis: $r = 3 + 2 \cos(-\theta) = 3 + 2 \cos \theta$ Yes

b.) Line $\theta = \frac{\pi}{2}$: $3 + 2 \cos(\pi - \theta)$

$$3 + 2[\cos \pi \cos \theta + \sin \pi \sin \theta]$$

Ex. 10 $r = 1 + 2 \cos \theta$ (limacon w/ inner loop)

Ex. 11 $r = 2 \cos(2\theta)$

Ex. 12 $r^2 = 4 \sin(2\theta)$

Ex. 13 $r = e^{\theta/5}$

Ex. 14 $r = 2 + 2 \sin \theta$