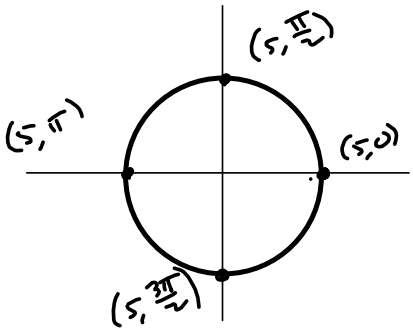
Section 6.8 - Graphs in Polar Coordinates.



In Polar Coordinates, this is the circle $r = 5$!

In rectangular:

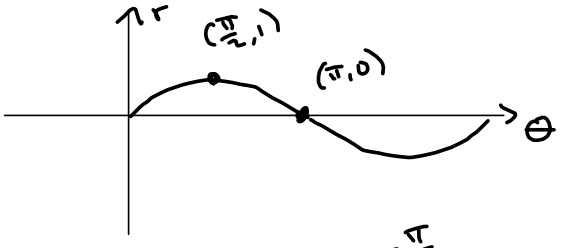
$x^2 + y^2 = 5^2$

$r^2 = 25$

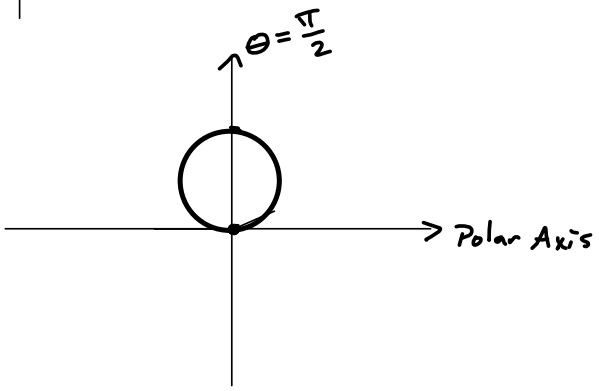
$r = 5$

Also, $r = -5$

$r = \sin\theta$ in rectangular coordinates

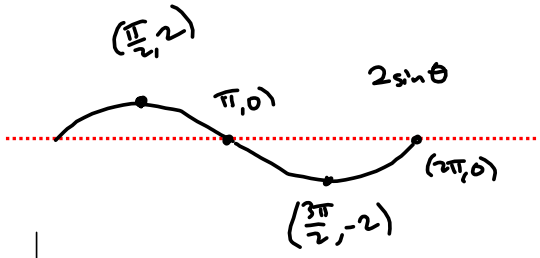


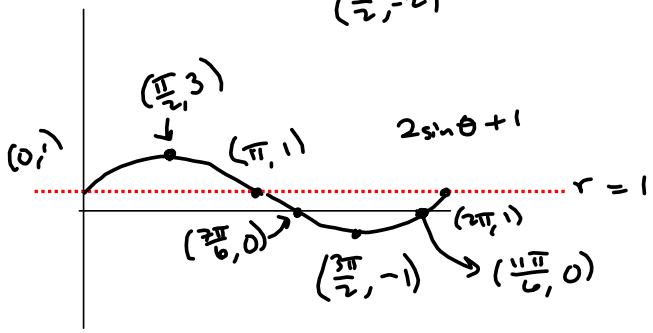
$y = \sin x$ with $r \in \theta$.



$r = 1 + 2\sin\theta = 2\sin\theta + 1$

Amp = 2 $y = 1$ mid

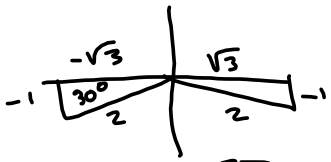




$r = 2\sin\theta + 1 = 0$

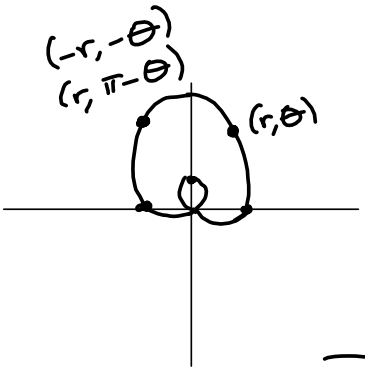
$2\sin\theta = -1$

$\sin\theta = -\frac{1}{2}$

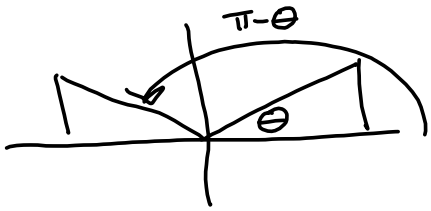


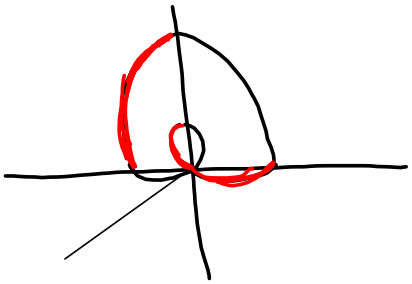
$\theta = 210° = \frac{7\pi}{6}$

$= 330° = \frac{11\pi}{6}$



Notice: Symmetric about $\theta = \frac{\pi}{2}$





Check for symmetry about $\theta = \frac{\pi}{2}$: replace θ by $\pi - \theta$ & simplify. If you get an equivalent expression (equation), then it's symmetric about the line $\theta = \frac{\pi}{2}$.

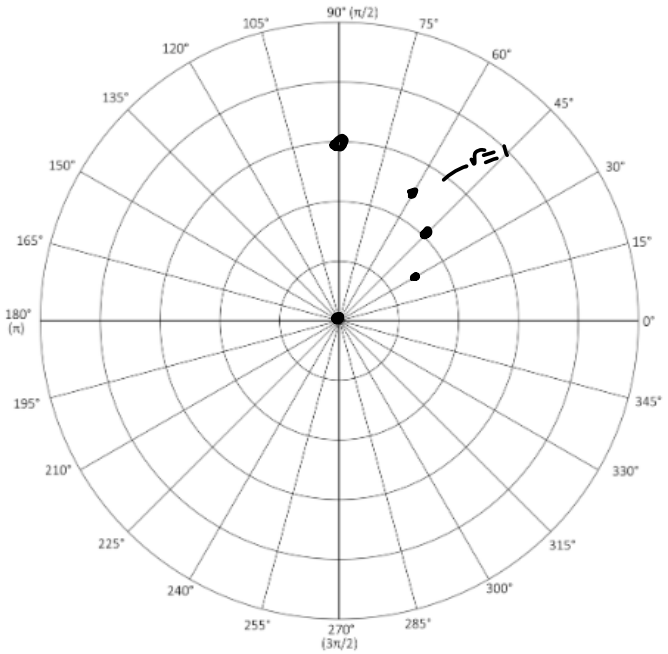
$r = 2\sin\theta + 1$

$r \stackrel{?}{=} 2\sin(\pi - \theta) + 1$

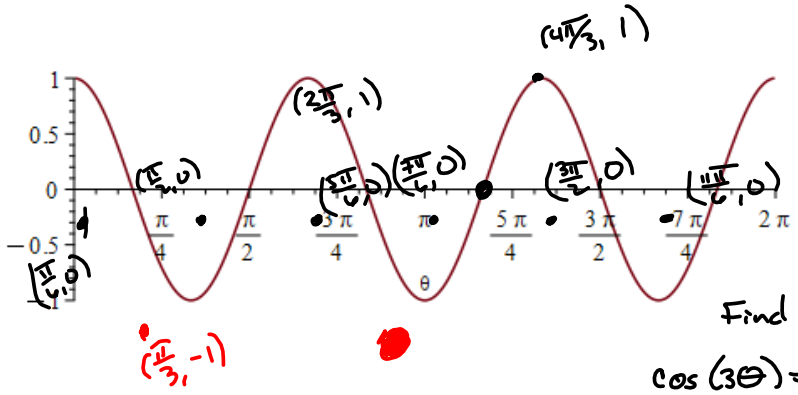
$= 2\sin\pi\cos(-\theta) + 2\sin(-\theta)\cos\pi + 1$

$= 0 - (2\sin\theta)(-1) + 1 = 2\sin\theta + 1$ SAME!

Sometimes a form of symmetry will exist, but one of the tests not give you an equivalent equation.


90° (π/2)
75°
60°
45°
30°
15°
0°
345°
330°
315°
300°
285°
270°
(3π/2)
255°
240°
225°
210°
195°
180°
(π)
165°
150°
135°
120°
105°

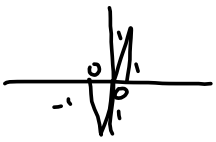
$r = \cos(3\theta)$



Find all $\theta \in [0, 2\pi)$

$3\theta \in [0, 6\pi)$

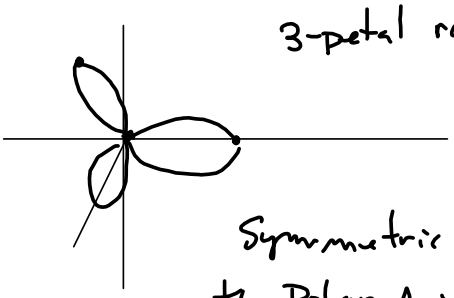
$\cos(3\theta) = 0$



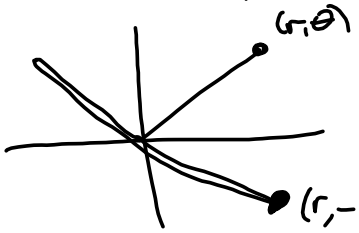
$3\theta = \frac{\pi}{2}, \frac{3\pi}{2}, \frac{5\pi}{2}, \frac{7\pi}{2}, \frac{9\pi}{2}, \frac{11\pi}{2}, \cancel{\frac{13\pi}{2}}$

$\theta = \frac{\pi}{6}, \frac{3\pi}{6} = \frac{\pi}{2}, \frac{5\pi}{6}, \frac{7\pi}{6}, \frac{9\pi}{6} = \frac{3\pi}{2}, \frac{11\pi}{6}$

3-petal rose



Symmetric About the Polar Axis

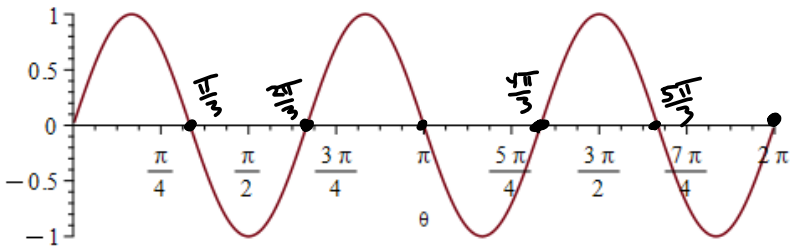


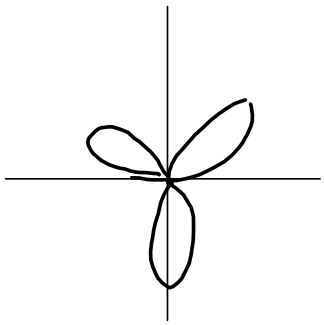
$r = \cos(3\theta)$

$r = \cos(3(-\theta))$

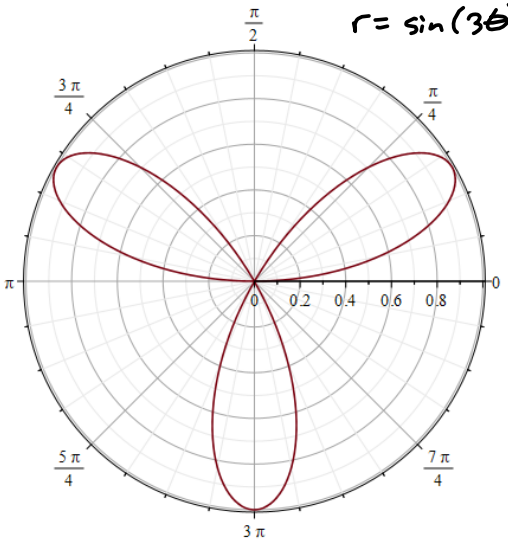
$= \cos(3\theta)$ ✓ Yes.

$r = \sin(3\theta)$

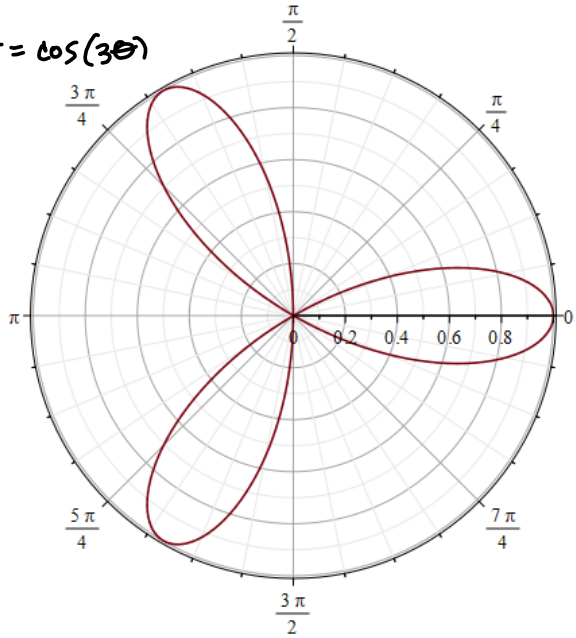




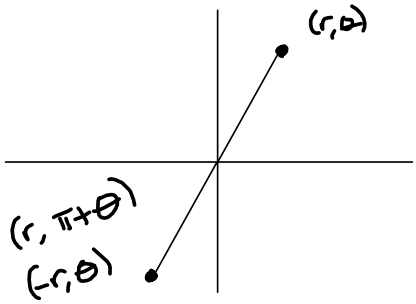
$r = \sin(3\theta)$



$r = \cos(3\theta)$



Symmetry thru the Pole



Try $(r, \pi+\theta) \neq (-r,\theta)$

Section 6.9 - Totally Optional

Next time: Wrap up Section 6.8. Begin Reviewing from Old Finals.

Monday - Final Test any time from 10 am to 6 pm start time. Monday, May 11th.

Horizon Hall, Rm 107.

I'll be here at the usual time, Monday morning, in case anybody needs anything or has any questions or wants to see any examples.