Open Test Dates for the Final: 12/11, 12/12

HORIZON HALL 107

I THINK the hours will be 8 am to 6 pm for starting your test.

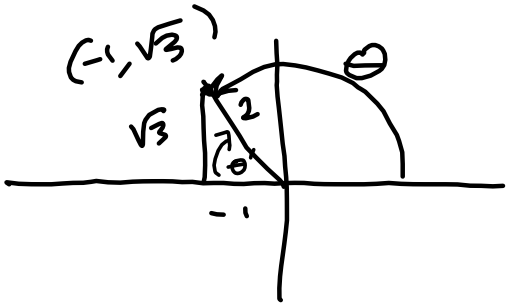
Bring pen or pencil, scientific calculator (not graphing calculator), 1 page 2-sided cheat sheet., ruler or straight edge, and photo ID.

Polar Coordinates:

Instead of (x, y), we have (r, θ)

$r = \sqrt{x^2+y^2}$, $\theta = \arctan\left(\frac{y}{x}\right)$ in QI

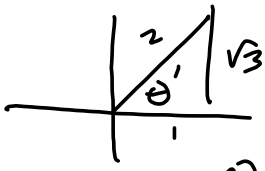
Convert $(-1, \sqrt{3}) \rightsquigarrow (2,$



$\theta' = \arctan\left(\frac{\sqrt{3}}{1}\right)$

$\theta = \pi - \arctan(\sqrt{3})$

$= \pi - \frac{\pi}{3} = \frac{2\pi}{3}$

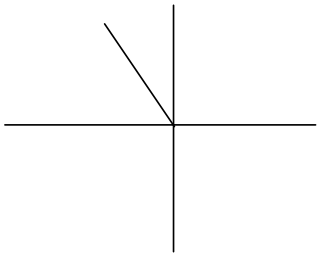


$\theta' = \frac{\pi}{3} = 60^\circ$

So $(r, \theta) = (2, \frac{2\pi}{3})$

$= (2, \frac{8\pi}{3})$ also works.

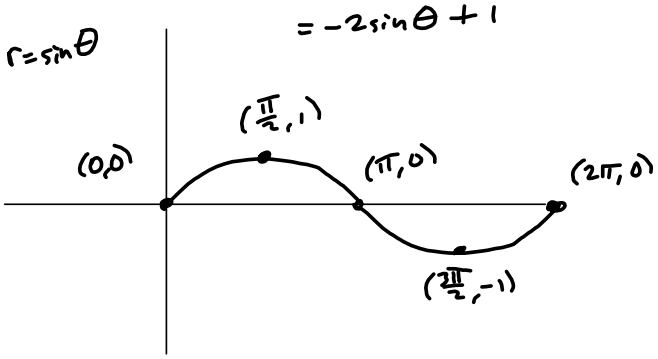
$= (-2, -\frac{\pi}{3})$



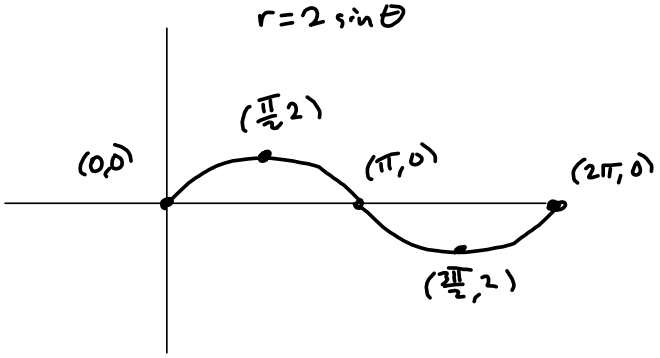
Sketch $r = 1 - 2\sin\theta$ in rectangular coords.

$= -2\sin\theta + 1$

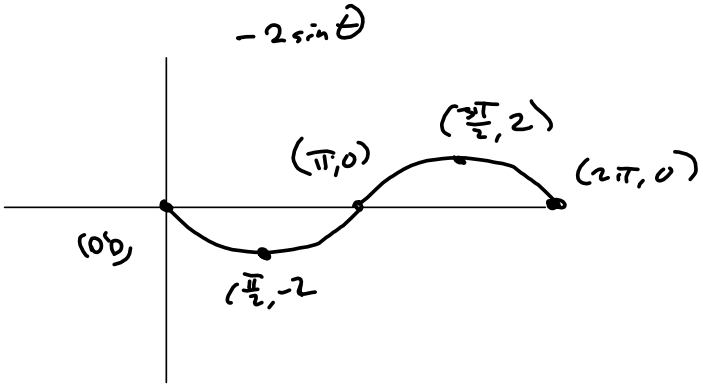
$r = \sin\theta$

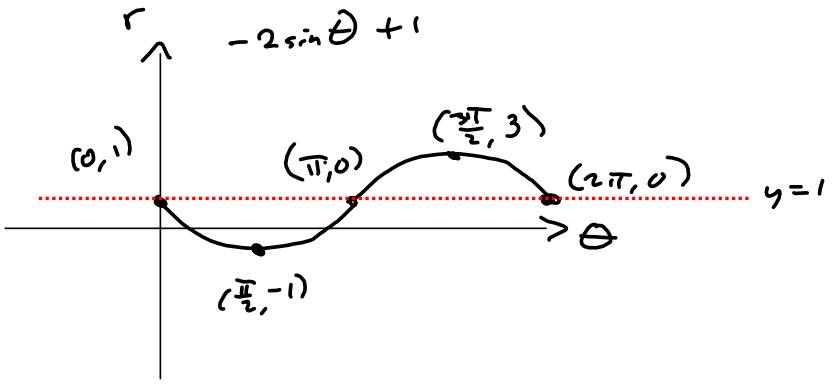


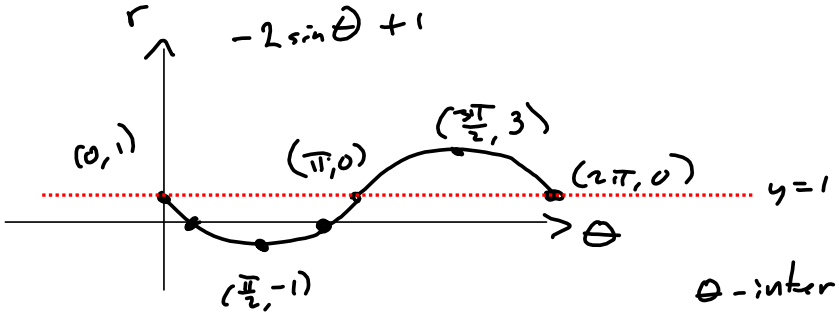
$r = 2\sin\theta$



$-2\sin\theta$







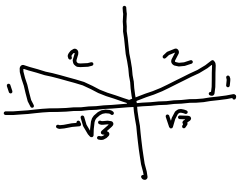
Now Graph it in Polar Coordinates.

θ-intercepts

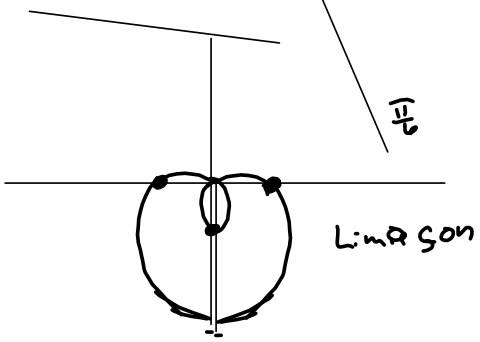
$-2\sin\theta+1=0$

$2\sin\theta=1$

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



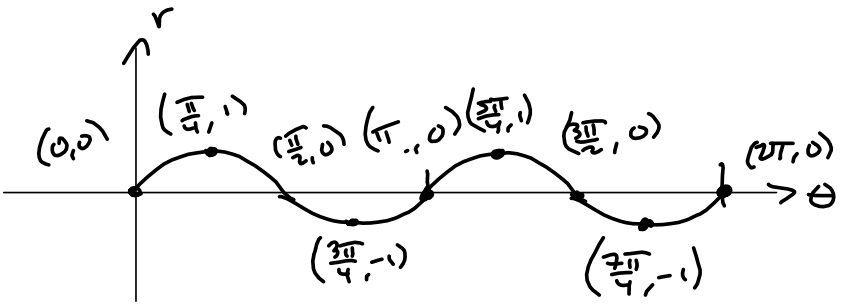
$\theta=\frac{\pi}{6},\frac{5\pi}{6}$

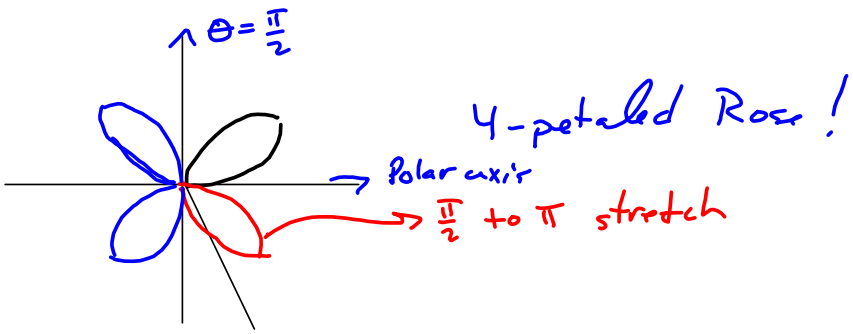


Symmetry $f(\sin\theta)=r$

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

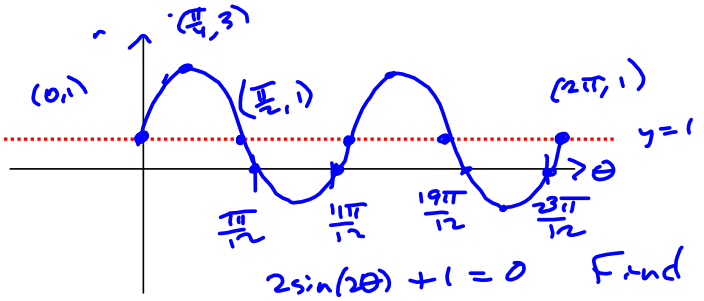
$r = \sin(2\theta) =$





4-petaled Rose!

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



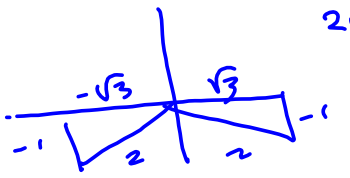
$2\sin(2\theta) + 1 = 0$ Find all zeros in $[0, 2\pi]$

$2\sin(2\theta) = -1$

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

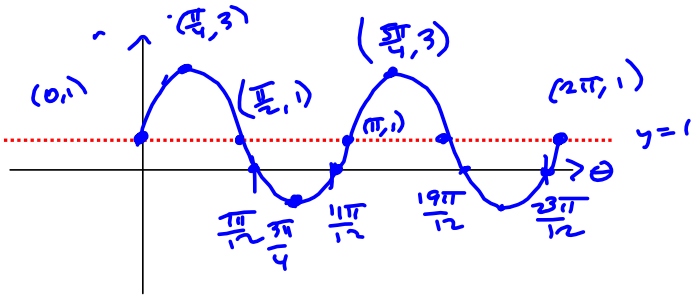
$\theta \in [0, 2\pi] \Rightarrow$

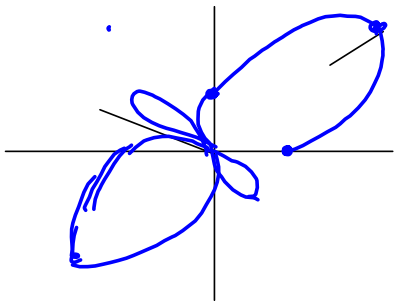
$2\theta \in [0, 4\pi]$

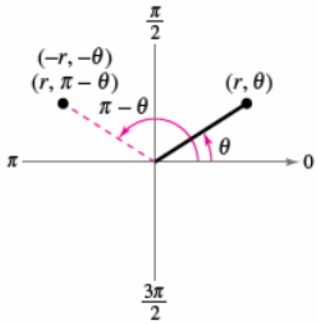


$2\theta = \frac{7\pi}{6}, \frac{11\pi}{6}, \frac{19\pi}{6}, \frac{23\pi}{6} \Rightarrow$

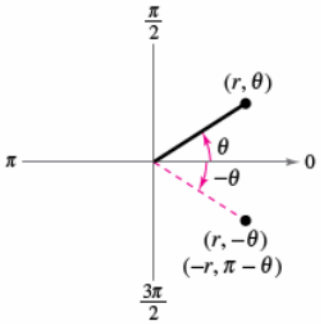
$\theta = \frac{7\pi}{12}, \frac{11\pi}{12}, \frac{19\pi}{12}, \frac{23\pi}{12}$



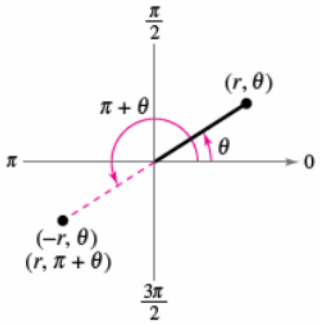




Symmetry with Respect to the Line $\theta = \frac{\pi}{2}$



Symmetry with Respect to the Polar Axis



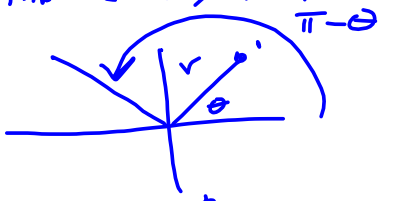
Symmetry with Respect to the Pole

I don't want to burden you with these details for a time-controlled test. But here's one example of how you might test the one we just did:

Symmetry

About $\theta = \frac{\pi}{2}$:

Replace (r, θ) by $(r, \pi - \theta)$



$r = 1 + \sin\theta$

$r = 1 + \sin(\pi - \theta)$

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

$= 1 + (-\sin\theta)(-1)$

$= 1 + \sin\theta$! Same !

It may help if you're stuck, to be able to run all these tests, but it's a lot of extra baggage to worry about under a time control, when the main thing is the basic skill of graphing in rectangular coordinates, first, and then building the polar graph from it.

Next Time: Conic Sections in Section 6.9

The "*p*" in Section 6.9 is not the same as the "*p*" for parabolas in earlier section.

In Section 6.9, *p* is the distance from the focus to the directrix

Wait !

Yeah. That's right. the *p* in Section 6.2 is the distance from the vertex to the focus.
In 6.9, the *p* is the distance from the focus to the *directrix*.