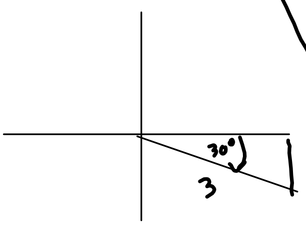
Section 6.7

Convert to Rectangular:

$(-3, \frac{5\pi}{6})$



TIMES $\frac{3}{2}$

$$\boxed{(x,y) = \left(\frac{3\sqrt{3}}{2}, -\frac{3}{2}\right)}$$

$$\frac{5\pi}{6} \cdot \frac{180^\circ}{\pi} = 150^\circ$$

Then the $r = -3$ takes us to Q$\underline{\text{IV}}$ from Q$\underline{\text{II}}$

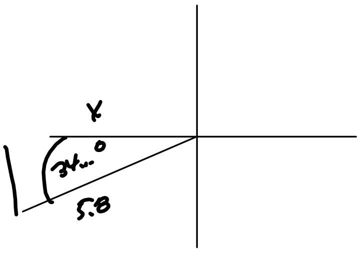
Use a graphing utility to find the rectangular coordinates of the point given in polar coordinates. Round your results to two decimal places.

(−5.8, 0.6) $= (r, \theta)$

$(.6)\left(\frac{180^\circ}{\pi}\right) \approx 34.37746771^\circ$

```
.6*180/π
          34.37746771
```

To see it




```
          34.37746771
-5.8cos(Ans
          5.706239954
.6*180/π
          34.37746771
-5.8sin(Ans
          -1.038665294
```

$x = 5.8\cos(34...^\circ + 180^\circ)$

$= -5.8\cos(34...^\circ)$

$\approx$

$y = -5.8\sin(34...^\circ)$

$\approx$

?!

This is because I went to the trouble of converting to degrees, & then used cosine in Radians mode.

I could've been formulaic:

$x = r\cos\theta = -5.8\cos(.6)$

$\approx \boxed{-4.79 \approx x}$

$y = r\sin\theta = -5.8\sin(.6)$

$\approx \boxed{-3.27 \approx y}$

```
-5.8cos(.6
          -4.786946566
-5.8sin(.6
          -3.274926346
```

$y = x \longrightarrow \tan\theta = 1 \longrightarrow$

$r\sin\theta = r\cos\theta$

$\theta = \frac{\pi}{4}$ does it.
is what WebAssign wants

$x = a \longrightarrow r\cos\theta = a \longrightarrow$

$r = a\sec\theta$

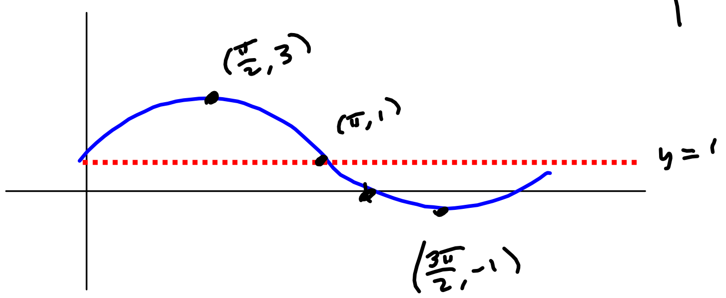
Convert the rectangular equation to polar form.

$3x - y + 6 = 0$

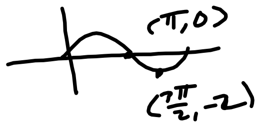
$$\boxed{r = -\frac{6}{3\cos(\theta) - \sin(\theta)}}$$ ✓

$3r\cos\theta - r\sin\theta = -6$ was also O.K.

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

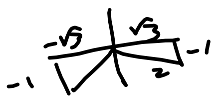


$r = 2\sin\theta$

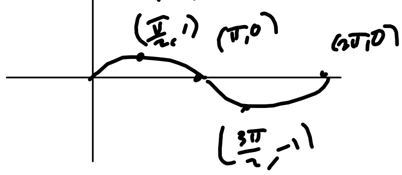


$2\sin\theta = -1 \rightarrow$

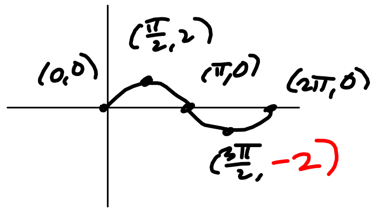
$\sin\theta = -\frac{1}{2}$



$r = \sin\theta$

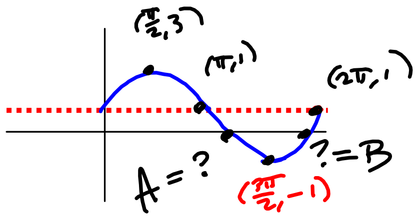


$r = 2\sin\theta$



$(\frac{7\pi}{4}, 0)$

$r = 2\sin\theta + 1$



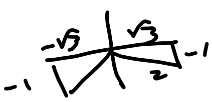
$2\sin\theta = -1$

$A = (\frac{7\pi}{4}, 0)$

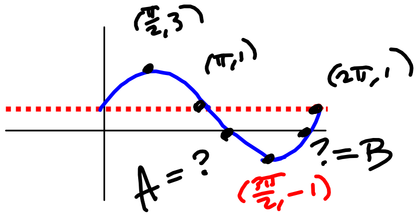
$B = (\frac{11\pi}{4}, 0)$

$2\sin\theta = -1 \rightarrow$

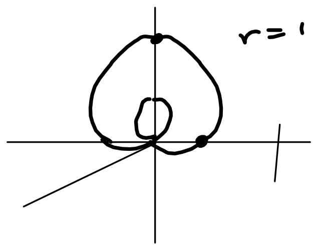
$\sin\theta = -\frac{1}{2}$



$\theta = \frac{7\pi}{6}, \frac{11\pi}{6}$

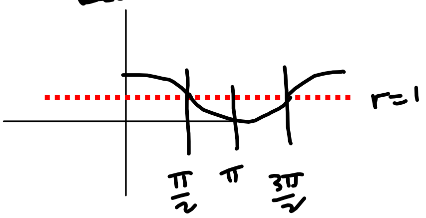


$r = 1 + 2\cos\theta$



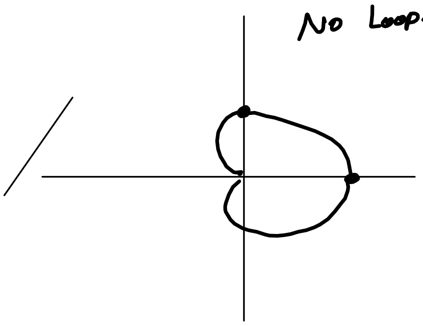
$r = 1 + \cos\theta$

Rect.



No Loop.

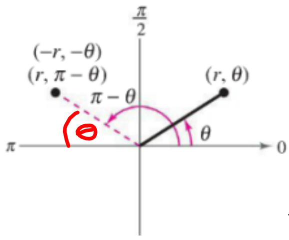
For A loop,
you Need
the negative bits



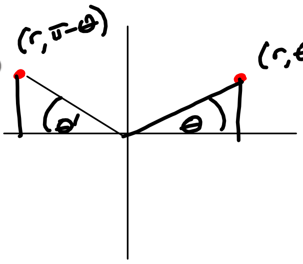
Homework Questions?

As usual, graphing by just plotting points is the last-ditch effort of a person who has no clue what the thing looks like. We want as much insight/intuition as possible to help guide us, starting with the different kinds of symmetry.

Replace (r, θ) by $(r, \pi - \theta)$ or $(-r, -\theta)$.



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



$r = 1 + \sin\theta$

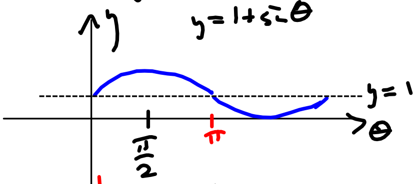
$r = 1 + \sin(\pi - \theta)$

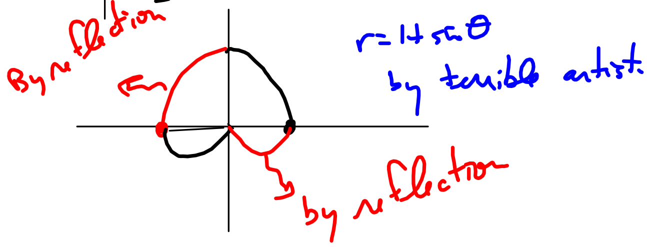
$= 1 + \sin\pi\cos(-\theta) + \sin(-\theta)\cos(\pi)$

$= 1 + 0\cos(-\theta) + (-\sin\theta)(-1)$

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

Rectangular coords





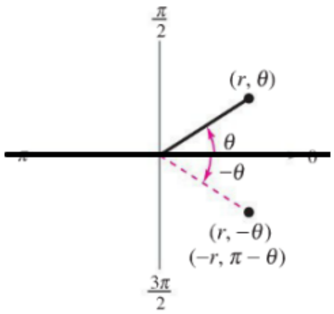
Also,

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

$-r = 1 - \sin\theta$

$r = \sin\theta - 1$ is NOT the same.

But it worked, before w/ $(r, \pi - \theta)$, so we have that type of symmetry.



Symmetry with Respect to the Polar Axis

2. The polar axis:

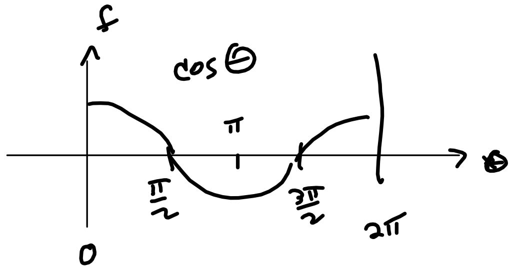
Replace (r, θ) by $(r, -\theta)$ or $(-r, \pi - \theta)$.

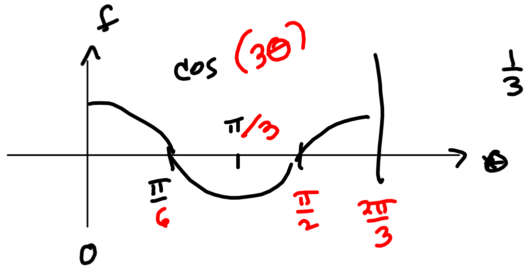
$r = \cos(3\theta) \rightsquigarrow r = \cos(3(-\theta)) = \cos(3\theta)$,

b/c cosine is even

$f(3x)$ from graph of $f(x)$

$(\frac{1}{3}x, y) \leftarrow (x, y)$





$\frac{1}{3}$ of the picture for a full circuit

We left off after the first two kinds of symmetry.

There's one more:

Symmetry about the Pole

I'll be referring to 4/26/23 notes from last spring.