Name: Solutions. Section: ____________

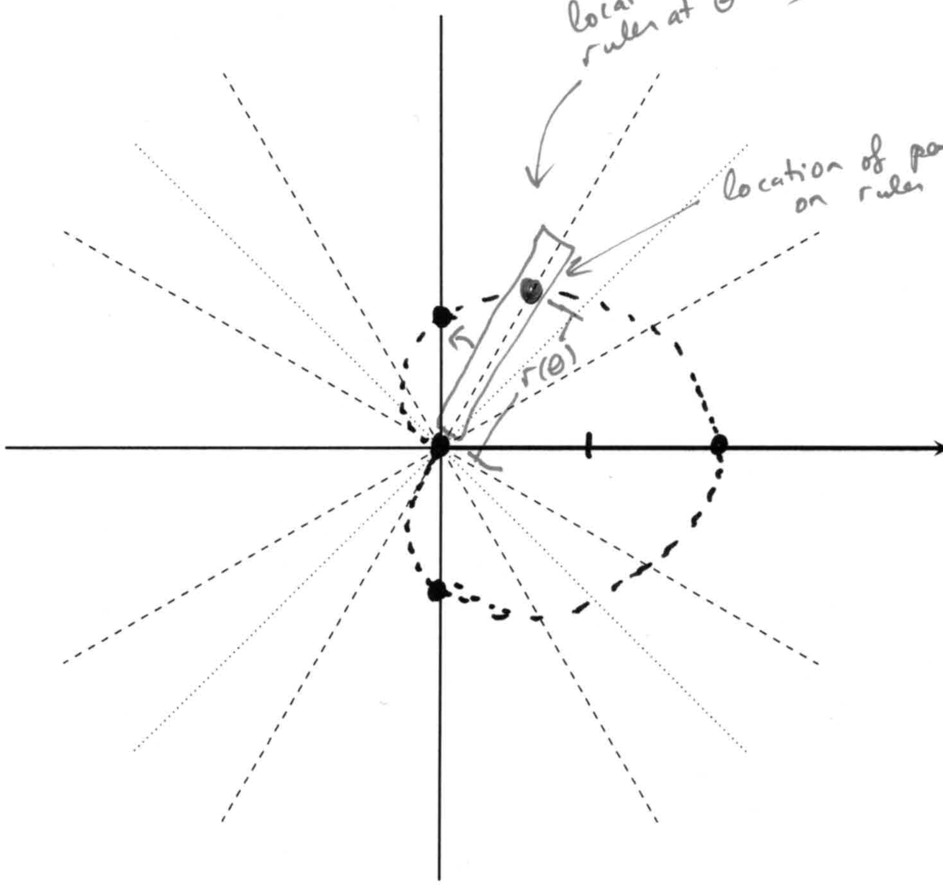
1. We would like to sketch the curve $r = 1 + \cos(\theta)$

   (a) Table of Values for selected θ in $[0, 2\pi]$ *(Optional, but often helpful)*

θ	0	$\frac{\pi}{2}$	π	$\frac{3\pi}{2}$	2π
r	2	1	0	1	2

   (b) Begin to sketch the polar curve $r = 1 + \cos(\theta)$

① plot table of values

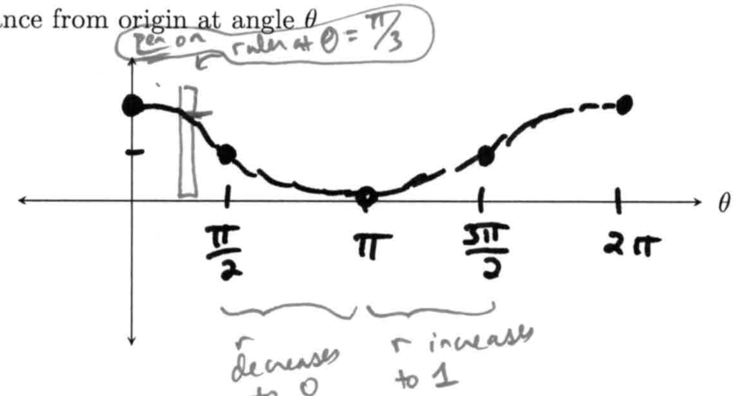


   (c) Graph r versus θ on $[0, 2\pi]$. Use this to complete the sketch of the curve from (b).

$r(\theta)$ = distance from origin at angle θ

IDEA
there is a Ruler rotating w/ angle θ

At angle θ, the pen is at the $r(\theta)$ mark of the ruler



Name: ______________________ Section: ______________________

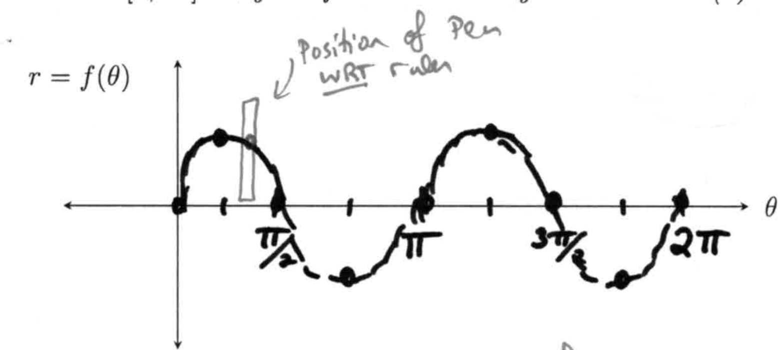
2. Sketch the curve $r = \sin(2\theta)$

   (a) What is the period of $r = \sin(2\theta)$? (*i.e.* at what θ does $\sin(2\theta)$ complete one period).

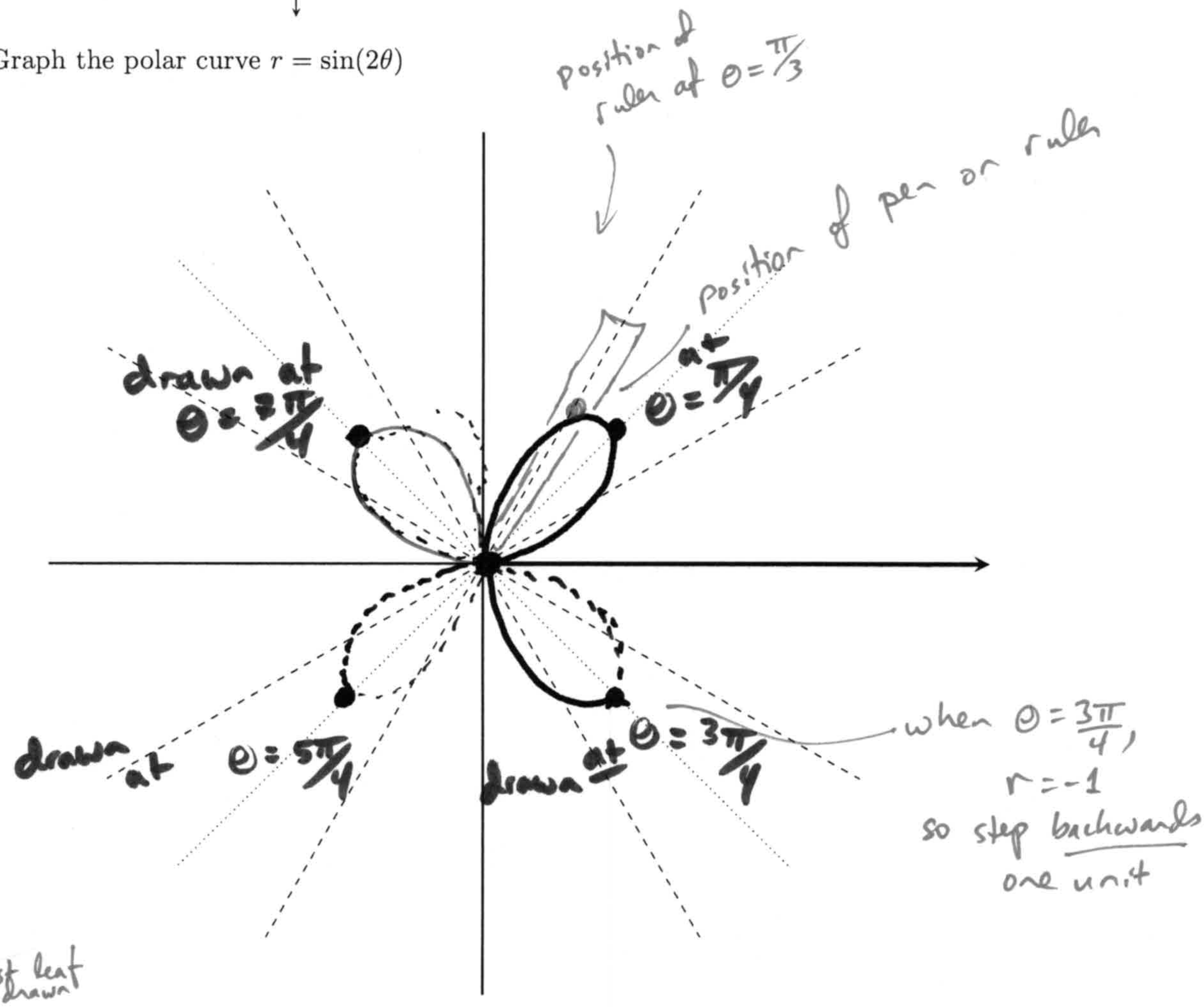
   the period of $\sin(2\theta)$ is π

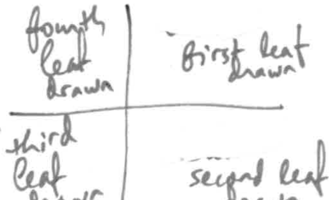
   (for what θ does $\underbrace{2\theta}_{\text{input to sine}} = \underbrace{2\pi}_{\text{period of sine}}$?)

   (b) Graph r versus θ on $[0, 2\pi]$. *Pay careful attention to your answer to (a)*



   (c) Graph the polar curve $r = \sin(2\theta)$



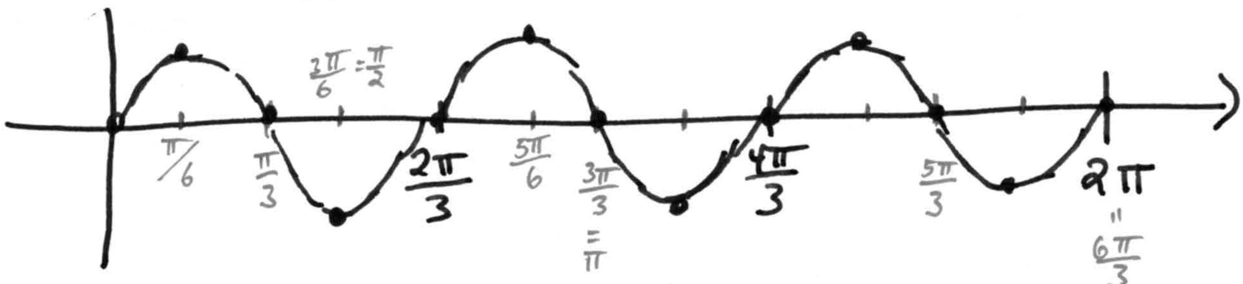


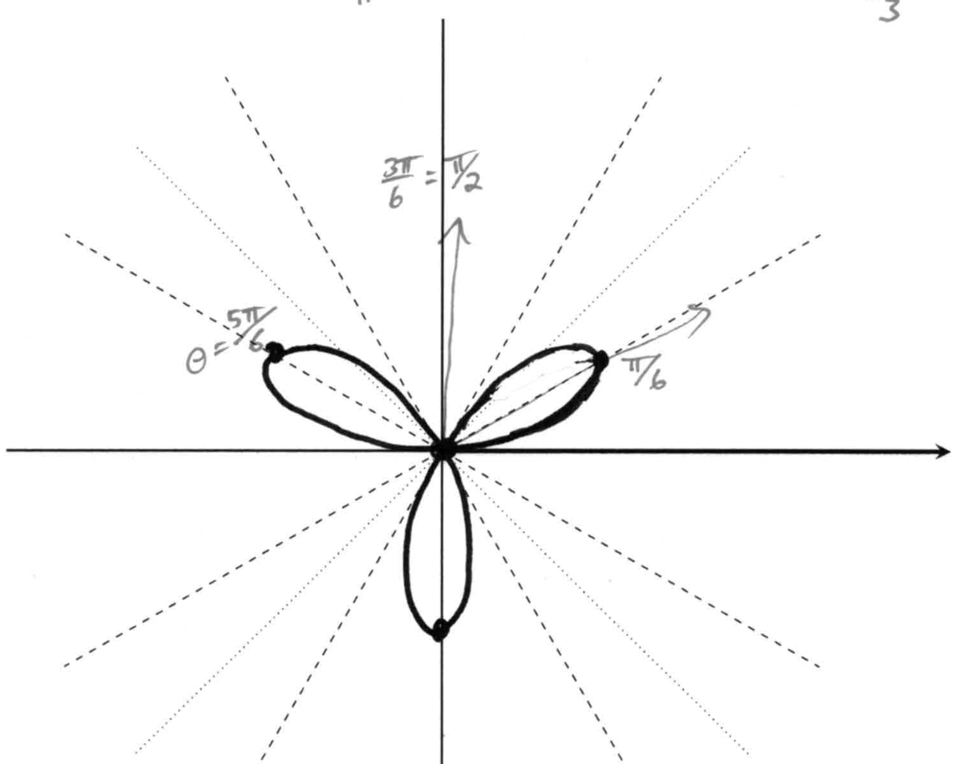
Name: ______________________ Section: ______________________

3. Sketch the curve $r = \sin(3\theta)$

one period when $3\theta = 2\pi$, $\theta = \frac{2\pi}{3}$

dividing $\frac{2\pi}{3}$ into 4 gives increments of $\frac{2\pi}{3} \cdot \frac{1}{4} = \frac{\pi}{6}$





the picture is drawn once in $[0, \pi]$

check same picture drawn twice in $[0, 2\pi]$.

Name: ______________________ Section: ______________________

4. Find a Cartesian Equation for the curve $r = \sin(2\theta)$

note: need $\sin\theta$ NOT $\sin(2\theta)$.

Know $x = r \cdot \cos\theta$

$y = r \cdot \sin\theta$

$r^2 = \sqrt{x^2+y^2}$

Know $\sin(2\theta) = 2 \cdot \cos\theta \cdot \sin\theta$

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

$r = 2 \cdot \cos\theta \cdot \sin\theta$

want: $r\cos\theta$ and $r\sin\theta$

$r^3 = 2 \cdot \underline{r \cdot \cos\theta} \cdot \underline{r \cdot \sin\theta}$

$\left(\pm\sqrt{x^2+y^2}\right)^3 = 2 \cdot x \cdot y$

the cartesian equation for the two leaf rose