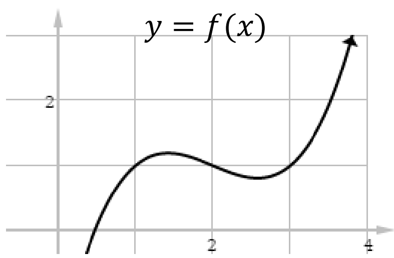
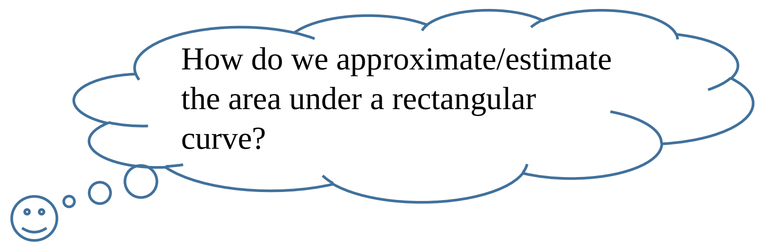
DATE: ____________________

Area with Polar Curves

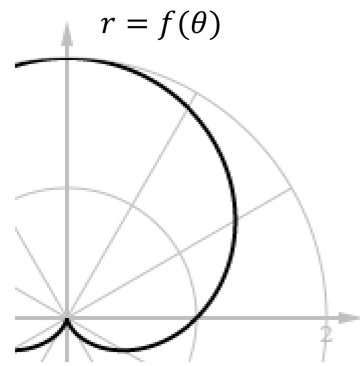
Estimate the area formed by the polar function $r = 1 - \cos\theta$.

Finding the Area Inside a Polar Curve





Now, thinking about Polar Curves:
Can we estimate the area the same way with a polar curve? Yes / No
[*Remember polar points are (r, θ), not (x, y)]



What should be used instead of area of rectangles? ________________________________

Area of a Sector = $\frac{\theta}{2\pi} \cdot \pi r^2$

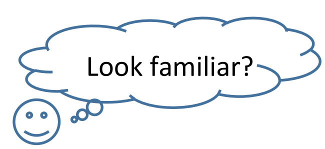
=

=

Sum of n sectors $= \sum_{k=1}^{n} \frac{1}{2}\left(f(\theta)\right)^2 \Delta\theta_k$

Sum of infinite # of sectors $= \sum_{k=1}^{n} \frac{1}{2}\left(f(\theta)\right)^2 \Delta\theta_k$

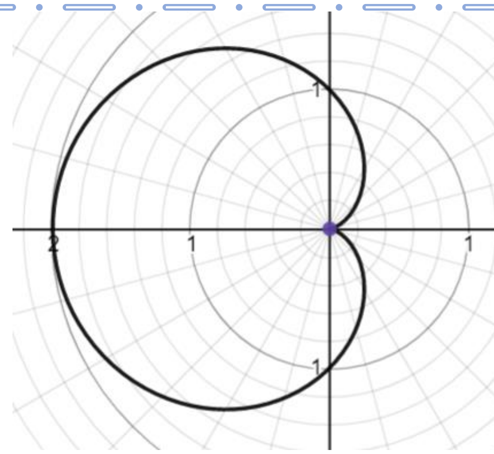
$= \sum_{k=1}^{n} \frac{1}{2}\left(f(\theta)\right)^2 \Delta\theta_k$



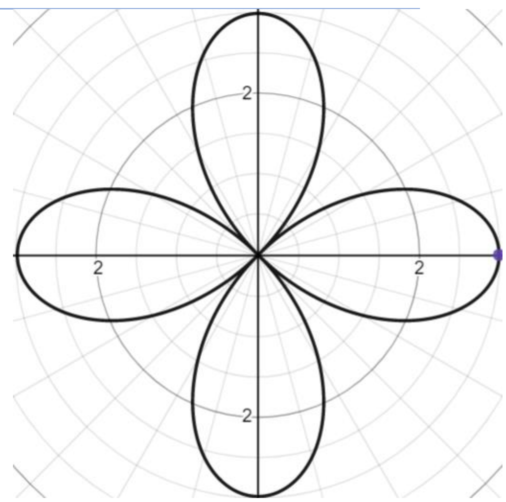
Area Inside ("under") Polar Curve =

Area with Polar Curves

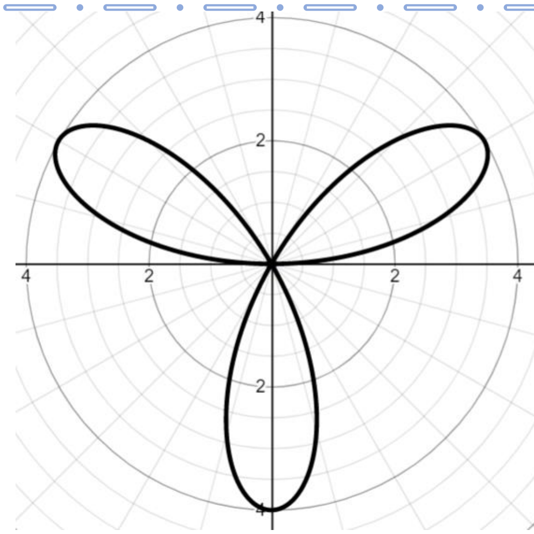
Example 1:
Find the area formed by the polar function $r = 1 - \cos\theta$.



Example 2:
Setup the area inside the polar function $r = 3\cos 2\theta$.
Then, use a graphing calculator to evaluate the area.



Example 3:
Setup the area inside the polar function $r = 4\sin 3\theta$.
Then, use a graphing calculator to evaluate the area.



Example 4:
Setup, but do not evaluate, an integral to find the area inside the polar curve $r = 2 + 4\sin\theta$.