

Section 11.3: Calculus in Polar Coordinates

Warm up:

- (a) True or False: The slope of the tangent line to the curve $r = f(\theta)$ at the point (r_0, θ_0) is given by $f'(\theta_0)$.
- (b) True or False: The area enclosed by the curve $r = 2 \cos(\theta)$ is

$$\int_0^{2\pi} \frac{1}{2} (2 \cos(\theta))^2 d\theta = \int_0^{2\pi} 1 - \cos(2\theta) d\theta = 2\pi.$$

Group work:

Problem 1 Find the equation of the tangent line to $r = 2 - \sin \theta$ at $\theta = \frac{\pi}{3}$. Also, determine for what values of θ the tangent lines to the curve are vertical or horizontal. Find the equations of the horizontal and vertical tangent lines.

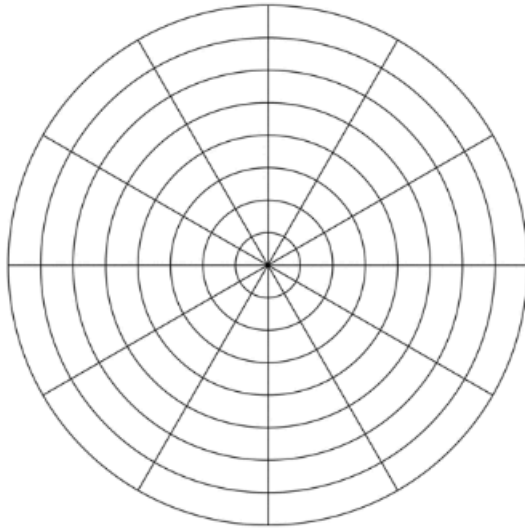
Problem 2 Graph each region and then SET UP an integral for the area of the region:

- (a) Outside the small loop and inside the large loop of $r = 3 - 6 \sin \theta$.
- (b) Inside both of the curves $r = 4 \cos \theta$ and $r = 1 - \cos \theta$.

Note that you do not need to evaluate these integrals.

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a.



b.

