

1. Consider the following.

$$\begin{aligned}x &= t^2 + 2t \\ y &= t - 3\end{aligned} \quad -2 \leq t \leq 3$$

(a) Eliminate the parameter

(b) Sketch the curve

2. **Set up only!**

Find the area inside both of the curves $r = \cos 2\theta$ and $r = \sin 2\theta$.

3. Find the area of the region that lies outside $r = 2$ and inside $r = 3 + 2\sin \theta$.

4. Find the area of the inner loop of $r = 2 + 4\cos \theta$.

5. Convert polar equation to rectangular form:

a) $r = 12\cos \theta$

b) $r = 5\theta$

6. Show that this Cartesian equation $x^3 + y^3 = 3xy$

can be written as this polar equation: $r = \frac{3\sec \theta \tan \theta}{1 + \tan^3 \theta}$

7. Consider the polar equation $r = 4\sin 3\theta$.

a) Find the slope of the tangent line at $\theta = \pi/6$ and $\theta = \pi/4$.

b) Sketch the graph.

c) Find the area of one leaf.