

Exercise 15

For the following exercises, sketch the parametric equations by eliminating the parameter. Indicate any asymptotes of the graph.

$$x = \sec t, \quad y = \tan t$$

Solution

Square both sides of each equation and subtract the respective sides.

$$\begin{aligned}x^2 - y^2 &= \sec^2 t - \tan^2 t \\ &= (\tan^2 t + 1) - \tan^2 t \\ &= 1\end{aligned}$$

This is a hyperbola centered at the origin opening towards the x -direction. Below is a plot of the parametric equations for $0 \leq t \leq 2\pi$.

