

$$x=1$$

$$r \cos \theta = 1$$

$$r = \sec \theta$$

Example: Find the length of the curve $r = \frac{1}{\cos \theta}$ for $0 \leq \theta \leq \frac{\pi}{3}$. You may assume that the curve traces out exactly once for the given interval of θ .

$$\int_0^{\pi/3} \sqrt{\sec^2 \theta + (\sec \theta \tan \theta)^2} d\theta = \int_0^{\pi/3} \sqrt{\sec^2 \theta + \sec^2 \theta \tan^2 \theta} d\theta$$

$$= \int_0^{\pi/3} \sqrt{\sec^2 \theta (1 + \tan^2 \theta)} d\theta = \int_0^{\pi/3} \sqrt{\sec^2 \theta \sec^2 \theta} d\theta$$

$$= \int_0^{\pi/3} \sec^2 \theta d\theta = \tan \theta \Big|_0^{\pi/3} = \tan\left(\frac{\pi}{3}\right) - \tan(0)$$

$$= \sqrt{3}$$

$$\frac{\pi}{3} \Rightarrow \omega$$

