

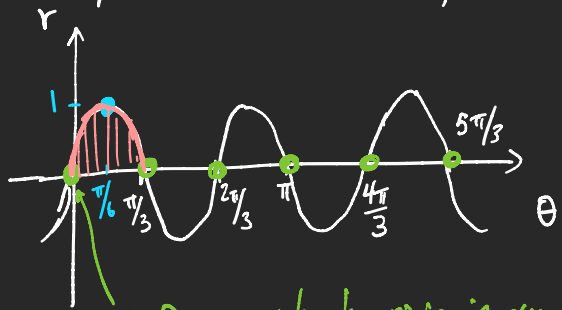
Example What's the area enclosed in one "petal" of the polar curve $r = \sin(3\theta)$?

You would write down an integral of the form

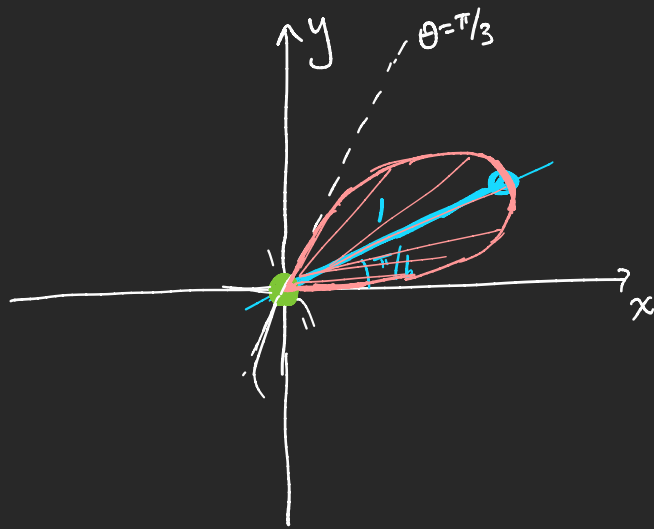
$$\int_{\theta_1}^{\theta_2} \frac{1}{2} r^2 d\theta$$

but what to put here?

How to qualitatively understand polar curves:



$r=0$ corresponds to origin in xy -plane.



So: $\theta_1 = 0$, $\theta_2 = \pi/3$ will suffice as bounds

$$\int_0^{\pi/3} \frac{1}{2} \sin^2(3\theta) d\theta = \dots$$

(use $\cos(6\theta)$)

$= 1 - 2\sin^2(2\theta)$ to solve this integral)