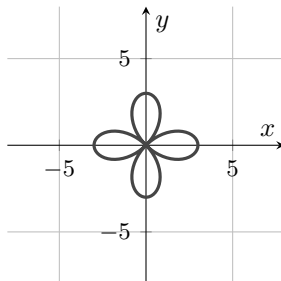
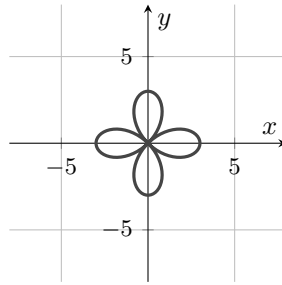


Question 2**Problem**

Find the area of one petal of $r = 3 \cos 2\theta$.



Question 2 – Solution



Solution

1. Determine an interval of angles that sweeps out the requested region exactly once, using symmetry when it simplifies the work.
2. For a polar boundary $r = f(\theta)$, use

$$A = \frac{1}{2} \int_a^b r^2 d\theta.$$

For a region between two curves, subtract the inner squared radius from the outer squared radius before integrating.

3. One petal is traced on $[-\pi/4, \pi/4]$.
4. Thus $A = \frac{1}{2} \int_{-\pi/4}^{\pi/4} 9 \cos^2 2\theta d\theta = \boxed{9\pi/8}$.