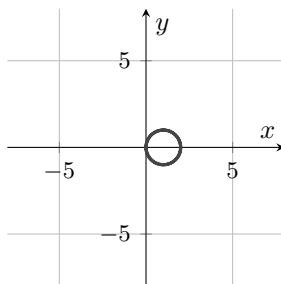
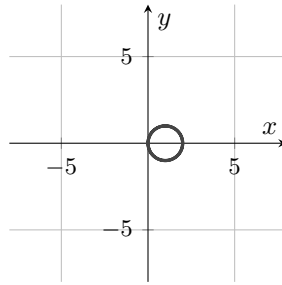


Question 4**Problem**

Find the common area of the circles $r = 2 \cos \theta$ and $r = 2 \sin \theta$.



Question 4 – 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. In the first quadrant the smaller radius switches at $\pi/4$.
4. Symmetry gives $A = \int_0^{\pi/4} (2 \sin \theta)^2 d\theta = \boxed{\pi/2 - 1}$.