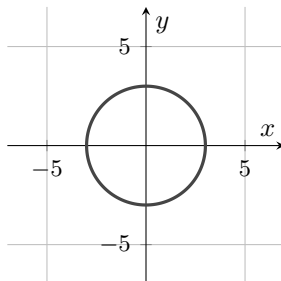
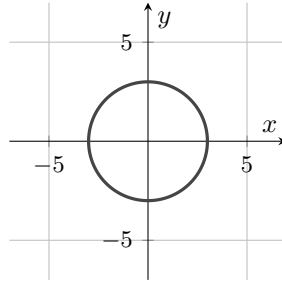


Question 4**Problem**

Use the polar arc-length formula to recover the circumference of $r = R$.



Question 4 – Solution**Solution**

1. Differentiate the polar radius to obtain $r' = dr/d\theta$ and choose an interval that traces the requested arc exactly once.
2. Use the polar arc-length formula

$$L = \int_a^b \sqrt{r^2 + \left(\frac{dr}{d\theta}\right)^2} d\theta.$$

Simplify the expression under the square root before evaluating or reporting the integral.

3. Since $r' = 0$, speed is R .
4. Hence $L = \int_0^{2\pi} R d\theta = \boxed{2\pi R}$.