

## Areas in polar coordinates

## Questions

**Question 1.** Find the slope of the tangent line to the polar curve  $r = 1/\theta$  when  $\theta = \pi$ .

**Question 2.** Sketch the polar curve  $r = 2 + \cos(\theta/3)$ . Then set up an integral which evaluates the area of the innermost loop.

**Question 3.** Sketch the polar curve  $r = \sin(3\theta)$ . How many “petals” does it have? Set up an integral which computes the area of one petal.

Then answer the same questions for  $r = \sin(4\theta)$ .

## More problems

**Problem 1.** Find the area of the region *underneath* the polar curve  $r = \theta$ ,  $2\pi/3 \leq \theta \leq 5\pi/6$ , depicted in Figure 1, in two ways:

- Convert to parametric equations and use methods of §10.2.
- First compute the area of the region with corners O, B, and D using methods of §10.4. Then use that to find the desired area. **Hint:** Think about the right triangles  $\triangle BAO$  and  $\triangle DCO$ .

Check that you get the same answer. Which method do you find easier?

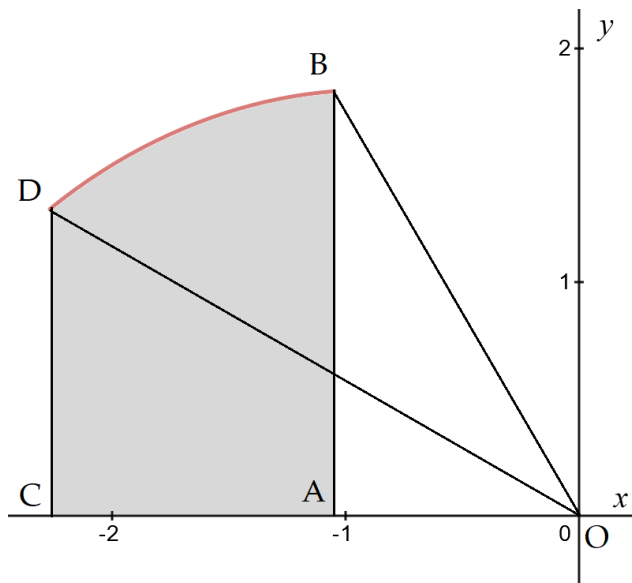


FIGURE 1