

W14 Regular

Due date: Sunday 4/19, 11:59pm

01

Sketching limaçons

Sketch the graphs of the following polar functions:

(a) $r = 2 + \sin \theta$ (b) $r = 2 \cos \theta$

(c) $r = 1 + 2 \sin \theta$ (d) $r = 3 + 3 \cos \theta$

✍ Polar curve - Slope of tangent line

Find the slope of the tangent line to the given polar curve:

$$r = \sin \theta + 3 \cos \theta \quad \text{at } \theta = \pi/2$$

Hint: First determine parametric Cartesian coordinate functions using θ as the parameter.

✍ Arclength of one loop of a rose

Consider the graph of the polar curve $r = 2 \cos 3\theta$.

Set up an integral which computes the arclength of one loop of this curve.

✍ Area of an inner loop

A limaçon is given as the graph of the polar curve $r = 1 + 2 \sin \theta$.

Find the area of the inner loop of this limaçon.

✍ Pickup region of a microphone - limaçon area

The pickup region of a microphone is described by a limaçon with equation $r = 8 + 8 \sin \theta$, and part of the region is on a stage.

Find the area of the part of the region on the stage.

