

Precalculus, Section 9.2, #54
Polar Coordinates

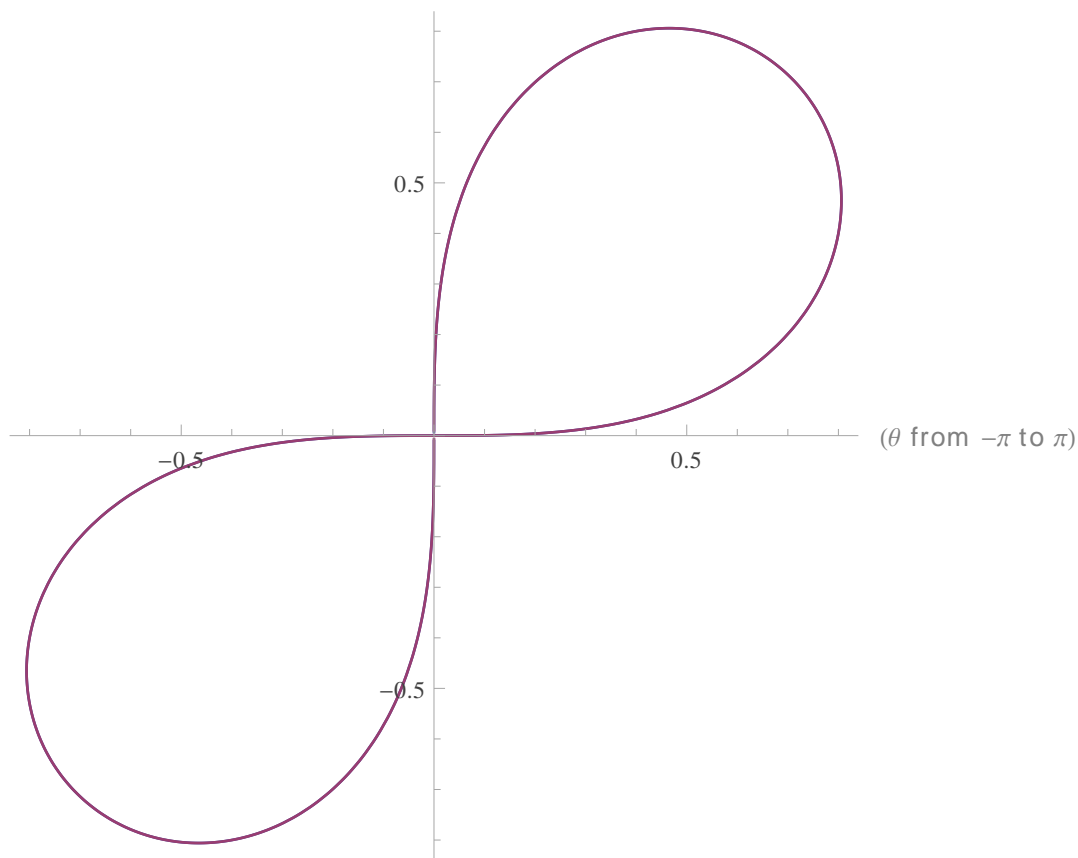
Identify and graph the polar equation. Verify your graph using a graphing utility.¹

$$r^2 = \sin(2\theta)$$

The given equation has the form $r^2 = a^2 \sin(2\theta)$ with $a > 0$, so the graph should be a lemniscate. Using the graphing utility will give us the graph of the function, after we solve for r

$$\begin{aligned} r^2 &= \\ \sqrt{r^2} &= \sqrt{\sin(2\theta)} \\ r &= \sqrt{\sin(2\theta)} \quad \text{or} \quad r = -\sqrt{\sin(2\theta)} \end{aligned}$$

Using WolframAlpha, we get the graph



plot $r^2 = \sin(2\theta)$ | Computed by Wolfram|Alpha

¹Sullivan, *Precalculus: Enhanced with Graphing Utilities*, p. 583, #54.