Graph of $r = \sin 2\theta$

This curve is a favorite; a similar curve appears in the homework. We'll plot a few points $(\sin 2\theta, \theta)$ to get an idea of what the graph of this curve looks like.

θ	$r = \sin 2\theta$
0	0
$\frac{pi}{4}$	1
$\frac{pi}{2}$	0

Note that $\sin 2\theta > 0$ for $0 < \theta < \frac{\pi}{2}$. So the curve starts at the origin, goes outward to the point $(1, \frac{\pi}{4})$ (which is $(\frac{\sqrt{2}}{2}, \frac{\sqrt{2}}{2})$ in rectangular coordinates), then returns to the origin as θ moves to point "up".

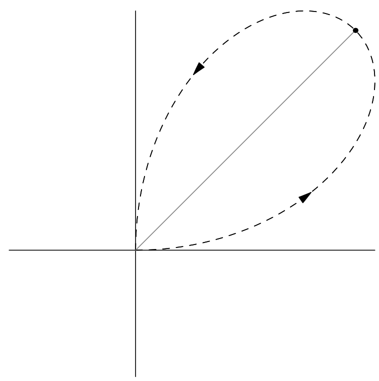

Figure 1: Graph of $r = \sin 2\theta$ for $0 < \theta < \frac{\pi}{2}$.

Because of the symmetries of the sine function, the curve will do something similar in each quadrant. However, it's useful to watch the curve being drawn in order to understand how its parts are connected.

The "loops" in the graph are caused by $r = \sin 2\theta$ changing sign each time the graph intersects the origin. When $\frac{\pi}{2} < \theta < \pi$, our angle is in the second quadrant; the portion of the graph corresponding to those values of θ appears opposite the angle, in the fourth quadrant.

If we want to compute the area of one petal of this rose, we have to be careful to use the right bounds for θ.

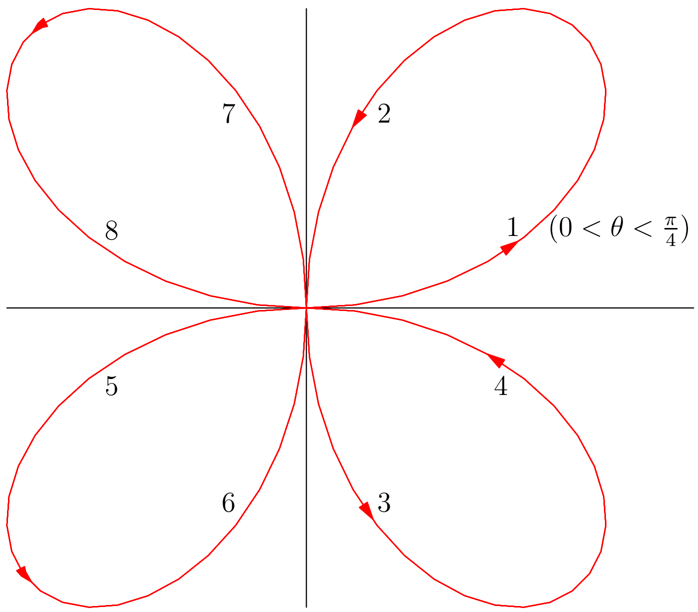

Figure 2: Graph of $r = \sin 2\theta$; a four leaf rose.