1 13.4: Polar Coordinates

Let \((x, y)\) be a point in the (2-dimensional) plane. Define the polar coordinates of the point as follows:

Graphs of Polar Equations:
Examples:

Plot the polar point \( \left( 2, \frac{4\pi}{3} \right) \) and find the Cartesian coordinates of the point.

Find the polar coordinates of the point \((5, -5\sqrt{3})\). (Make \( r > 0 \) and \( 0 \leq \theta \leq 2\pi \))

Sketch the region of the plane consisting of all points where \( 2 \leq r \leq 4 \) and \( \frac{3\pi}{4} \leq \theta \leq \pi \) and find the area of this region.
Sketch the polar curve $r = \sin \theta$ and find a Cartesian equation for the curve.

Find a polar equation for the curve $2(x^2 + y^2)^2 = 25(x^2 - y^2)$ and sketch the graph.