

Lesson 45. Polar Coordinates

1 Polar coordinates

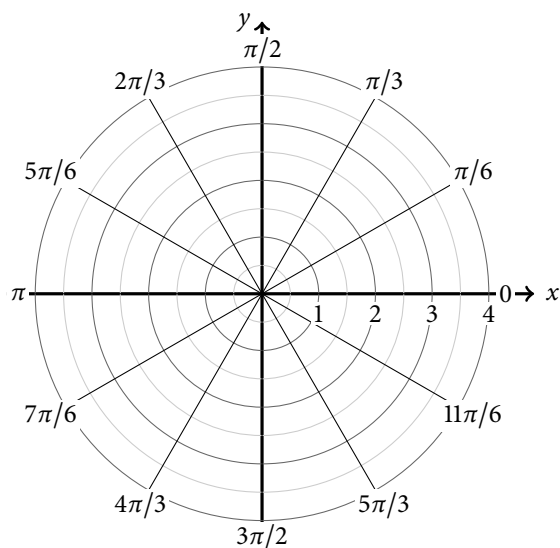
- **Polar coordinate system:** specify points in the xy -plane as (r, θ) where

o $r =$

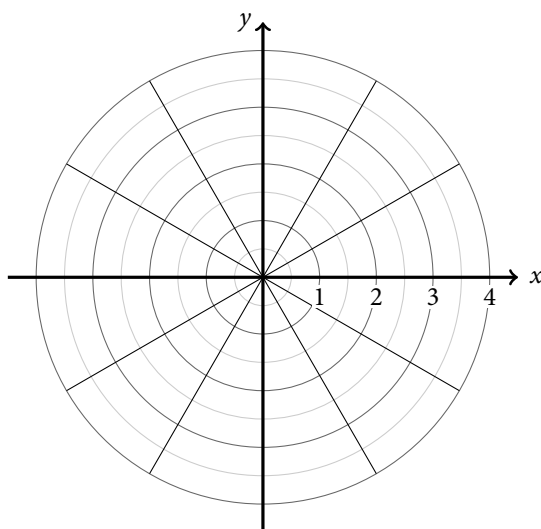
o $\theta =$

Example 1. Plot the points corresponding to the following polar coordinates:

- a. $(1, \pi/6)$
- b. $(2, 3\pi/4)$
- c. $(3, -2\pi/3)$
- d. $(-3, 3\pi/4)$



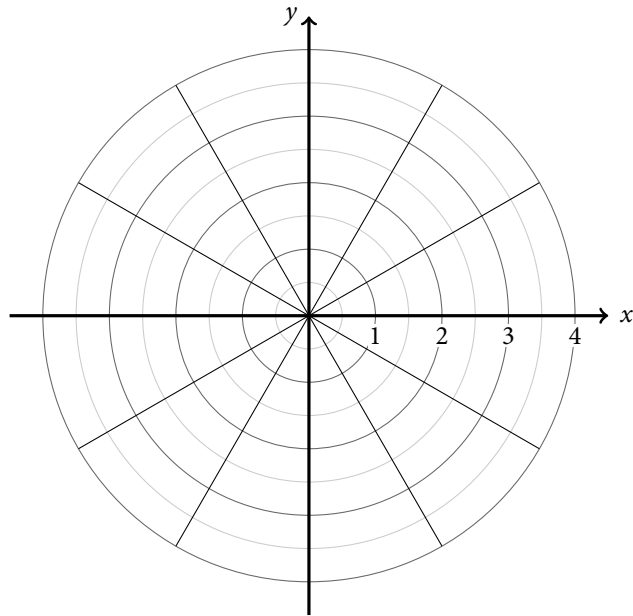
Example 2. Sketch the region in the plane consisting of points whose polar coordinates satisfy: $1 \leq r \leq 3$, $\pi/6 \leq \theta \leq 5\pi/6$.



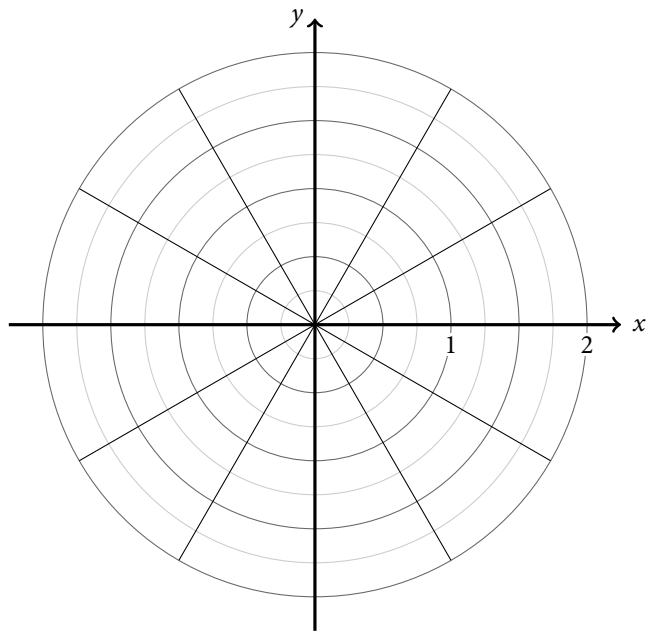
2 Polar curves

- The **graph of a polar equation** $F(r, \theta) = 0$ consists of all points that can be represented by some polar coordinates (r, θ) that satisfy the equation

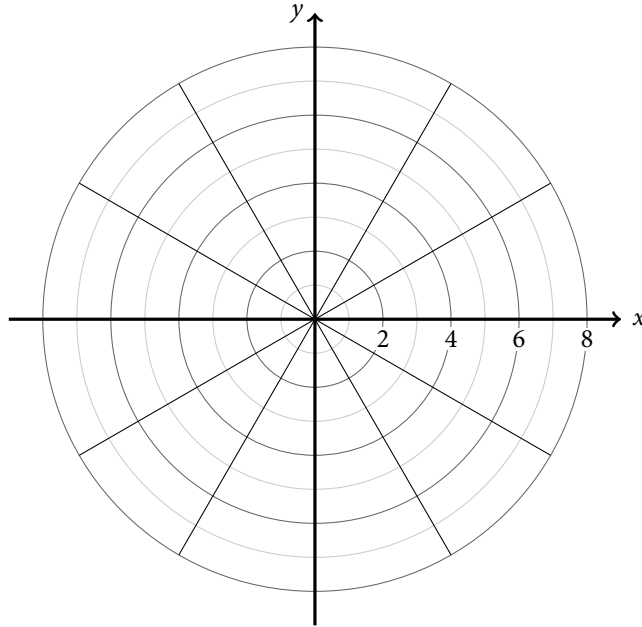
Example 3. Sketch the following curves: (a) $r = 2$, (b) $\theta = \pi/3$.



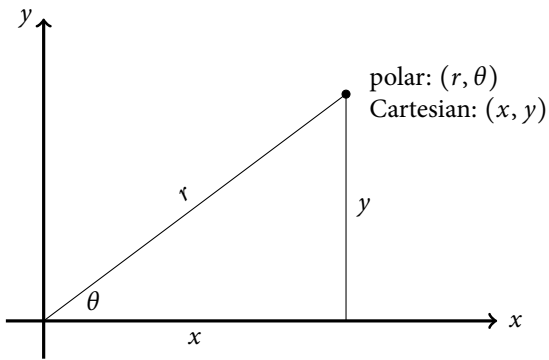
Example 4. Sketch the curve with polar equation $r = 2 \cos \theta$.



Example 5. Sketch the curve with polar equation $r = \theta$ ($\theta \geq 0$).



3 Correspondence between polar and Cartesian coordinates



- $x =$
- $y =$
-
-

Example 6. Find a Cartesian equation for the curve $r = 2 \cos \theta$.