Magnet Precalculus CD
Polar coordinates

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Contents

Chapter 1

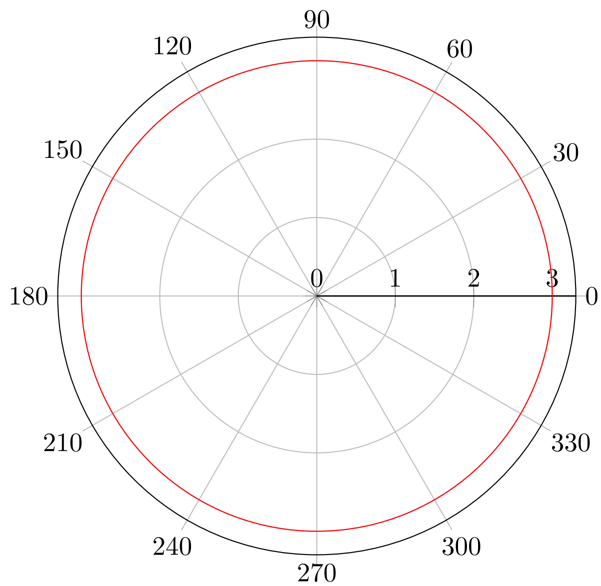
Introduction to Polar Coordinates

Normally, points and functions are represented rectangularly, with an x and a y coordinate. However, they can also be represented in polar form.

Definition 1.0.1: Polar Coordinates

A coordinate represented by a distance from the origin r and an angle from the positive x-axis θ. Polar coordinates are in the form (r, θ).

In polar functions, the dependent variable is generally r. With polar, you can far more easily graph circles and other curves. For instance, take $r = 3$:



Chapter 2

Polar function types

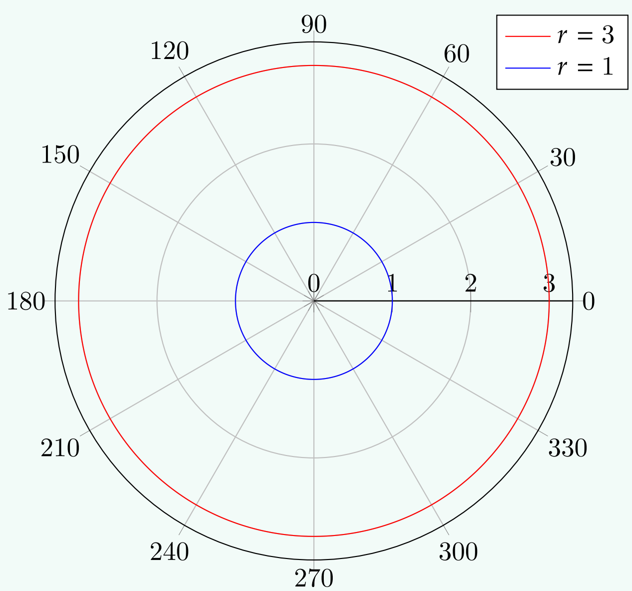
2.1 Circle

Circles in polar form are fairly simple. There are three kinds:

- $r = n$
- $r = n\sin(\theta)$
- $r = n\cos(\theta)$

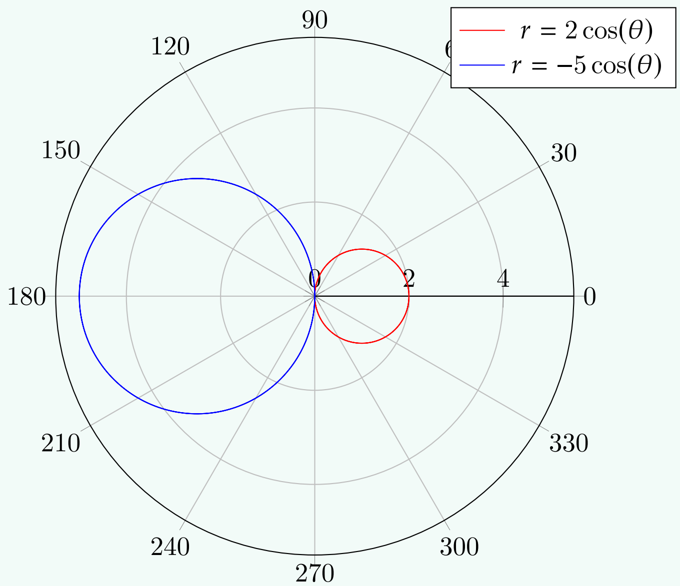
In the case of $r = n$, the circle is centered on the pole (or the origin), and has a radius of $|n|$.

Example 2.1.1 ($r = n$ circle)



In the case of $r = n\cos(\theta)$, the circle is centered at (polar) $(\frac{n}{2}, 0)$ and has a radius of $\frac{n}{2}$. You can also think of it as being centered on the polar axis (or positive x-axis), tangent to the pole, and tangent to the polar point $(n, 0)$.

Example 2.1.2 ($r = n\cos(\theta)$ circle)



The function $r = n\sin(\theta)$ is the same as $r = n\cos(\theta)$, but instead of being centered on the polar axis, it is centered on the polar line $\theta = \frac{\pi}{2}$ (or the y-axis).

Example 2.1.3 ($r = n\sin(\theta)$ circle)