

CIRCUI AR COORDINATES

Why

We identified points in \mathbb{R}^2 with elements of the plane in a natural way.¹

Definition

Let $(x, y) \in \mathbb{R}^2$. Then $(r, \theta) \in \mathbb{R}^2$ is the polar form or circular form of (x, y) if

$$x = r\cos\theta$$
 and $y = r\sin\theta$.

In this case we call r and θ the *circular coordinates* or *polar coordinates*.

Since sin and cos polar coordinates are not unique.

Non-uniqueness

A difficult with polar coordinates is that there are many elements of \mathbb{R}^2 that correspond to the same point in the plane. For example, consider the points

$$(5, \pi/3), (5, -5\pi/3), (-5, 4\pi/3), (-5, -2\pi/3).$$

Each of these specifies the same point in \mathbb{R}^2 .

¹Future editions will expand on this in the genetic approach, and likely reference celestial motion.

