1 Lecture 10

1.1 Curves in polar form

Polar coordinates are an alternative description to cartesian coordinates (x, y).

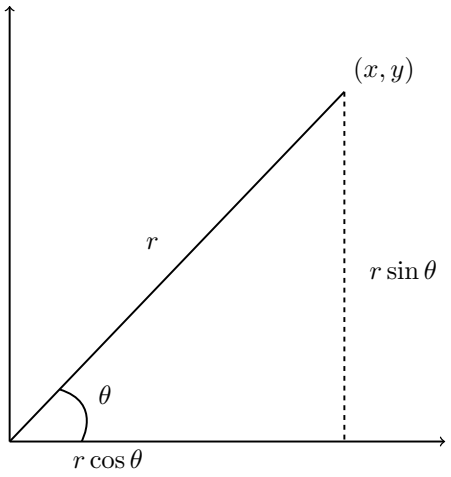
Definition 1. The polar coordinates r, θ are defined by

$$x = r\cos\theta, \quad y = r\sin\theta$$

Their range is respectively

$$0 \leq r \leq \infty, \quad 0 \leq \theta \leq 2\pi$$

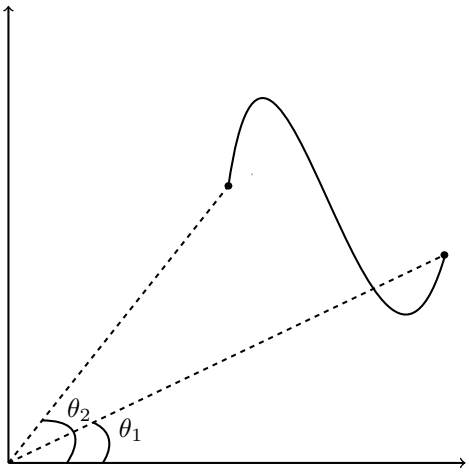
Geometrical meaning is that r is the distance from the origin, and θ is the angle.



From (x, y) to (r, θ), we can use

$$r^2 = x^2 + y^2$$

We can describe curves using (r, θ). The idea is to give r as a function of θ. The curve will be "traced" as we vary θ. It is an analogue of $y = f(x)$


θ_2
θ_1