Cartesian Equations:

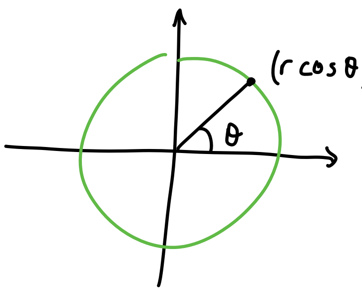
$f(x) = y$ ← univariate equations

$f(x, y) = x^2 + y^2 + r^2 = 0$ ← bivariate equations

Parametric Equations:

Take an equation of a circle:

$f(x, y) = x^2 + y^2 + r^2 = 0$ (cartesian form)



since any point (x, y) can be expressed as $(r\cos\theta, r\sin\theta)$,

We can write a parametric equation:

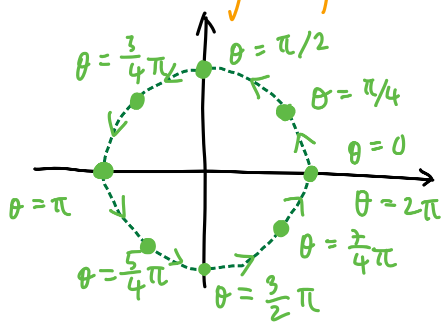
$$\begin{cases} x = r\cos\theta \\ y = r\sin\theta \end{cases}, \quad 0 \le \theta \le 2\pi$$

Imagine θ (sometimes we use t) being time.

At any point in time, the parametric equations identify a point.

Stepping through time, the point moves.

The traced path will be the plot.



Ex 8B

7. $x = 3\cot^2 2t$ $\qquad$ $y = 3\sin^2 2t$ $\qquad$ $0 < t \leq \frac{\pi}{4}$

$$\downarrow \qquad\qquad \downarrow$$

$x = \dfrac{3\cos^2 2t}{\sin^2 2t}$ $\qquad$ $\sin^2 2t = \dfrac{y}{3}$

$x = \dfrac{9\cos^2 2t}{y}$