

MA205 - Integral Calculus
Lesson 31: Parametric Equations I

1. Plot the following parametric curves in Mathematica and then sketch them on your paper. Indicate with an arrow the direction in which the curve is traced as the parameter increases.

(a)
$$\begin{aligned}x &= \sqrt{t} \\y &= 1 - t\end{aligned}$$

(b) $\langle \sin(\theta), \cos(\theta) \rangle, 0 \leq \theta \leq \pi.$

(c)
$$\begin{aligned}x &= 1 + \sin(t) \\y &= 5 \cos(t)\end{aligned}, 0 \leq t \leq 2\pi.$$

(d) $\langle \sqrt{s}, \sin(s) \rangle, 0 \leq s \leq 3\pi.$

2. For each of the parametric equations above, eliminate the parameter to find a Cartesian equation of the curve.

3. Let's find parametric equations for a bug that crawls from one point straight to another. He starts off at the point $(2, 3)$ and 10 minutes later he arrives at the point $(-2, 4)$. Find parametric functions $x(t)$ and $y(t)$ that trace out his path as t ranges from 0 to 10.