

Curve sketching and proofs

Curve sketching

A curve C has parametric equations

$$x = 3 + 2 \sin t, \quad y = 4 + 2 \cos 2t, \quad 0 \leq t < 2\pi$$

(a) Show that all points on C satisfy $y = 6 - (x - 3)^2$ (2)

(b) (i) Sketch the curve C .

(ii) Explain briefly why C does not include all points of $y = 6 - (x - 3)^2$, $x \in \mathbb{R}$ (3)

The line with equation $x + y = k$, where k is a constant, intersects C at two distinct points.

(c) State the range of values of k , writing your answer in set notation. (5)