

14. The curve C , in the standard Cartesian plane, is defined by the equation

$$x = 9 \sin 2y \quad -\frac{\pi}{4} < y < \frac{\pi}{4}$$

(a) Find the value of $\frac{dy}{dx}$ at the origin.

(2)

(b) (i) Use the small angle approximation for $\sin 2y$ to find an equation linking x and y for points close to the origin.

(ii) Explain the relationship between the answers to part (a) and part (b)(i).

(2)

(c) Show that, for all points (x, y) lying on C ,

$$\frac{dy}{dx} = \frac{1}{a\sqrt{b-x^2}}$$

where a and b are constants to be found.

(3)

(Total for Question 14 is 7 marks)