Air maths tuition

Interact, engage and perform

Turning points | Past Paper Question | C2 Edexcel January 2013 Q8

The curve C has equation $y = 6 - 3x - \frac{4}{x^3}$, $x \neq 0$

(a) Use calculus to show that the curve has a turning point P when $x = \sqrt{2}$

(b) Find the x-coordinate of the other turning point Q on the curve.

(c) Find $\frac{d^2y}{dx^2}$.

(d) Hence or otherwise, state with justification, the nature of each of these turning points P and Q.

a) $y = 6 - 3x - 4x^{-3}$

$\therefore \frac{dy}{dx} = -3 + 12x^{-4} = -3 + \frac{12}{x^4}$

At a turning pt. $\frac{dy}{dx} = 0$

$\therefore -3 + \frac{12}{x^4} = 0$

$\therefore -3x^4 + 12 = 0$

$\therefore x^4 = 4$

$\therefore x = \pm\sqrt[4]{4}$

$\therefore x = \pm\sqrt{2}$

$\therefore$ at P, $x = \sqrt{2}$

b) at Q, $x = -\sqrt{2}$

c) $\frac{d^2y}{dx^2} = -48x^{-5}$

$= -48/x^5$

d) At P: $x = \sqrt{2}$

$\therefore \frac{d^2y}{dx^2} = -\frac{48}{(\sqrt{2})^5} < 0$

At P: local maximum

At Q: $x = -\sqrt{2}$

$\therefore \frac{d^2y}{dx^2} = -\frac{48}{(-\sqrt{2})^5} > 0$

Q: local minimum

With the acknowledgement of Exam Solutions.

Find lots more revision sheets on Air Maths Tuition.

This Video

Exam Solutions

maths made easy