



Finding the Equation of a Curve Given The Differential Exam Questions Sheet 2

Q1.

$$f'(x) = \frac{(3-x^2)^2}{x^2}, \quad x \neq 0$$

(a) Show that $f'(x) = 9x^{-2} + A + Bx^2$,
where A and B are constants to be found.

(3)

(b) Find $f''(x)$.

(2)

Given that the point $(-3, 10)$ lies on the curve with equation $y = f(x)$,

(c) find $f(x)$.

(5)

(Total 10 marks)

Q2.

$$\frac{dy}{dx} = -x^3 + \frac{4x-5}{2x^3}, \quad x \neq 0$$

Given that $y = 7$ at $x = 1$, find y in terms of x , giving each term in its simplest form.

(6)

(Total 6 marks)

Q3.

The gradient of a curve C is given by

$$\frac{dy}{dx} = \frac{(x^2+3)^2}{x^2}, \quad x \neq 0.$$

(a) Show that

$$\frac{dy}{dx} = x^2 + 6 + 9x^{-2}.$$

(2)

The point $(3, 20)$ lies on C .

(b) Find an equation for the curve C in the form $y = f(x)$.

(6)

(Total for question = 8 marks)



Q4.

$$\frac{dy}{dx} = 6x^{-\frac{1}{2}} + x\sqrt{x}, \quad x > 0$$

Given that $y = 37$ at $x = 4$, find y in terms of x , giving each term in its simplest form.

(7)

(Total 7 marks)

Q5.

Given that $\frac{6x+3x^{\frac{5}{2}}}{\sqrt{x}}$ can be written in the form $6x^p + 3x^q$,

(a) write down the value of p and the value of q .

(2)

Given that $\frac{dy}{dx} = \frac{6x+3x^{\frac{5}{2}}}{\sqrt{x}}$, and that $y = 90$ when $x = 4$,

(b) find y in terms of x , simplifying the coefficient of each term.

(5)

(Total 7 marks)

Q6.

The curve with equation $y = f(x)$ passes through the point $(-1, 0)$.

Given that

$$f'(x) = 12x^2 - 8x + 1$$

find $f(x)$.

(5)

(Total 5 marks)

Q7.

A curve with equation $y = f(x)$ passes through the point $(2, 10)$. Given that

$$f'(x) = 3x^2 - 3x + 5$$

find the value of $f(1)$.

(5)

(Total 5 marks)

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Q8.

The curve C has equation $y = f(x)$, $x > 0$, where

$$\frac{dy}{dx} = 3x - \frac{5}{\sqrt{x}} - 2$$

Given that the point $P(4, 5)$ lies on C , find

(a) $f(x)$,

(5)

(b) an equation of the tangent to C at the point P , giving your answer in the form $ax + by + c = 0$, where a , b and c are integers.

(4)

(Total 9 marks)

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