Core 3 Differentiation Questions

(b) Given that $y = \dfrac{3x+1}{2x+1}$, show that $\dfrac{dy}{dx} = \dfrac{1}{(2x+1)^2}$. *(3 marks)*

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2 (a) Find $\dfrac{dy}{dx}$ when $y = (3x-1)^{10}$. *(2 marks)*

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6 (a) Find $\dfrac{dy}{dx}$ when:

  (i) $y = (4x^2 + 3x + 2)^{10}$; *(2 marks)*

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2 (a) Differentiate $(x-1)^4$ with respect to x. *(1 mark)*

Why so short?

Because the techniques learnt are embedded and checked in questions on other topics.

Core 3 Differentiation Answers

(b)

$$\frac{dy}{dx} = \frac{(2x+1)3 - 2(3x+1)}{(2x+1)^2} = \frac{6x+3-6x-2}{(2x+1)^2} \qquad \text{M1}$$

A1

$$= \frac{1}{(2x+1)^2} \qquad \text{A1} \qquad 3 \qquad \text{AG (no errors)}$$

use of quotient rule

Alternative

$$-2(3x+1)(2x+1)^{-2} + 3(2x+1)^{-1}$$

(M1A1)

$$= \frac{1}{(2x+1)^2} \qquad \text{(A1)}$$

Alternative:

$$y = \frac{3}{2} - \frac{1}{2}(2x+1)^{-1} \qquad \text{M1A1}$$

$$\frac{dy}{dx} = (2x+1)^{-2} \qquad \text{A1}$$

$$= \frac{1}{(2x+1)^2} \qquad \text{AG}$$

2(a) $\quad y = (3x-1)^{10}$

$$\frac{dy}{dx} = 10(3x-1)^9 \times 3 \qquad \text{M1 A1} \qquad 2 \qquad \text{M1 for } a(3x-1)^9 \text{ where } a = \text{constant}$$

$$= 30(3x-1)^9$$

6(a)(i) $\quad y = (4x^2+3x+2)^{10}$

$$\frac{dy}{dx} = 10(4x^2+3x+2)^9(8x+3) \qquad \begin{array}{c}\text{M1}\\\text{A1}\end{array} \qquad 2 \qquad \text{For } f(x)(\ )^9 \text{ where } f(x) \neq k \text{ and is linear}$$

2(a) $\quad 4(x-1)^3$ or in expanded form $\qquad$ B1 $\qquad$ 1 $\qquad$ allow $-4(1-x)^3$

Why so short?

Because the techniques learnt are embedded and checked in questions on other topics.