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1. The curve C has equation

$$y = (3x - 2)^6$$

(a) Find $\dfrac{\mathrm{d}y}{\mathrm{d}x}$

(2)

Given that the point $P\left(\dfrac{1}{3}, 1\right)$ lies on C,

(b) find the equation of the normal to C at P. Write your answer in the form $ax + by + c = 0$ where a, b and c are integers to be found.

(4)

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Question 1 continued

Q1

(Total 6 marks)

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2. The functions f and g are defined by

$$f(x) = \frac{5 - x}{3x + 2} \qquad x \in \mathbb{R}, x \neq -\frac{2}{3}$$

$$g(x) = 2x - 7 \qquad x \in \mathbb{R}$$

(a) Find the value of fg(5)

(2)

(b) Find f^{-1}

(3)

(c) Solve the equation

$$f\left(\frac{1}{a}\right) = g(a + 3)$$

(4)

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