

Name: *Solution*

Student Number:

Problem 1

Let $f(x) = 3x^3 + 4x^2 + 6x + 5$. Find $(f^{-1})'(5)$.

$$(f^{-1})'(5) = \frac{1}{f'(f^{-1}(5))}$$

(1) What is $f^{-1}(5)$?In other words, find x such that $f(x) = 5$.

$$\text{But } f(0) = 3 \cdot 0 + 4 \cdot 0 + 6 \cdot 0 + 5 = 5$$

$$\text{So, } f^{-1}(5) = 0$$

$$(2) \quad f'(x) = 9x^2 + 8x + 6$$

$$f'(f^{-1}(5)) = f'(0) = 6$$

$$(3) \quad \text{So, } (f^{-1})'(5) = \frac{1}{f'(f^{-1}(5))} = \frac{1}{6}$$

Problem 2

Evaluate the integral

$$\int \frac{\cos x}{2 + \sin x} dx$$

$$\text{let } u = 2 + \sin x$$

$$du = \cos x dx$$

$$\begin{aligned} \int \frac{\cos x}{2 + \sin x} dx &= \int \frac{du}{u} = \ln|u| + C \\ &= \ln|2 + \sin x| + C \end{aligned}$$