3: $f(x) = (3x^2 - 4x - 5)(x - k) - 5$

where k is a constant.

(a) Deduce the value of the remainder when $f(x)$ is divided by $(x - k)$

(1)

Given that the remainder when $f(x)$ is divided by $(x + 2)$ is 25

(b) show that the value of k is -4

(2)

(c) Hence find the quotient and remainder when $f(x)$ is divided by $(3x - 1)$

(4)

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Question 3 continued

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Question 3 continued

(Total for Question 3 is 7 marks)

4:

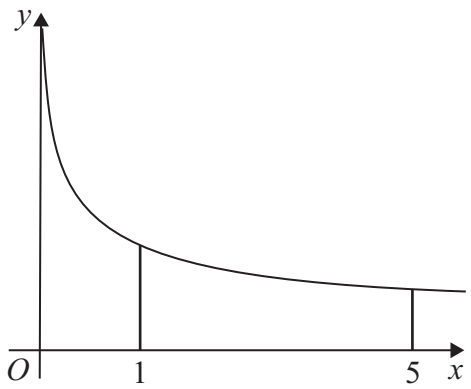

Figure 1

Figure 1 shows a sketch of part of the curve with equation

$$y = \log_3(x + 1) - \log_3 x$$

The point $P(a, 4)$ lies on the curve.

(a) Find the exact value of the constant a.

(*Solutions relying on calculator technology are not acceptable.*)

(4)

(b) Use the trapezium rule with 4 strips of equal width to estimate the value of

$$\int_1^5 \left(\log_3(x + 1) - \log_3 x\right) \mathrm{d}x$$

giving the answer in the form $\log_3 k$, where k is a constant to be found.

(4)

(c) Explain how the trapezium rule could be used to obtain a more accurate estimate for

$$\int_1^5 \left(\log_3(x + 1) - \log_3 x\right) \mathrm{d}x$$

(1)

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