3:

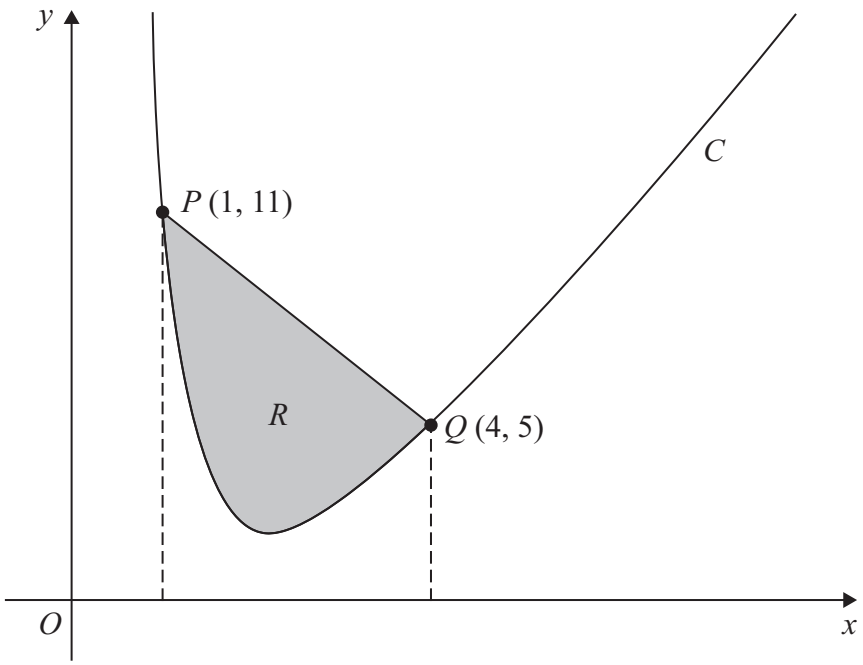


Figure 1

In this question you must show all stages of your working.
Solutions relying entirely on calculator technology are not acceptable.

Figure 1 shows a sketch of the curve C with equation

$$y = 3x + \frac{16}{x^2} - 8 \qquad x > 0$$

The points $P(1, 11)$ and $Q(4, 5)$ lie on C and are shown in Figure 1.

The region R, shown shaded in Figure 1, is bounded by C and line segment PQ.

Use algebraic integration to find the area of R.

(5)

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Question 3 continued

(Total for Question 3 is 5 marks)

4: The function f(x) is defined by

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

where a and b are constants.

Given that $(x + 3)$ is a factor of f(x),

(a) show that

$$b = 3a + 2$$

(2)

Given further that when f(x) is divided by $(2x - 1)$ the remainder is $\frac{7}{4}$

(b) find the value of a and the value of b.

(4)

(c) Using algebra, find the quotient and the remainder when f(x) is divided by $(x - 2)$

(3)

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