1. (a) Find the first 4 terms, in ascending powers of x, of the binomial expansion of

$$(2 + 5x)^{-2}$$

giving each term in simplest form.

(5)

(b) State the range of values of x for which this expansion is valid.

(1)

(c) Given that x is sufficiently small, find the values of a, b and c such that

$$\left(\frac{4}{2 + 5x}\right)^2 \approx a + bx + cx^2$$

(1)

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Question 1 continued

(Total for Question 1 is 7 marks)

2.

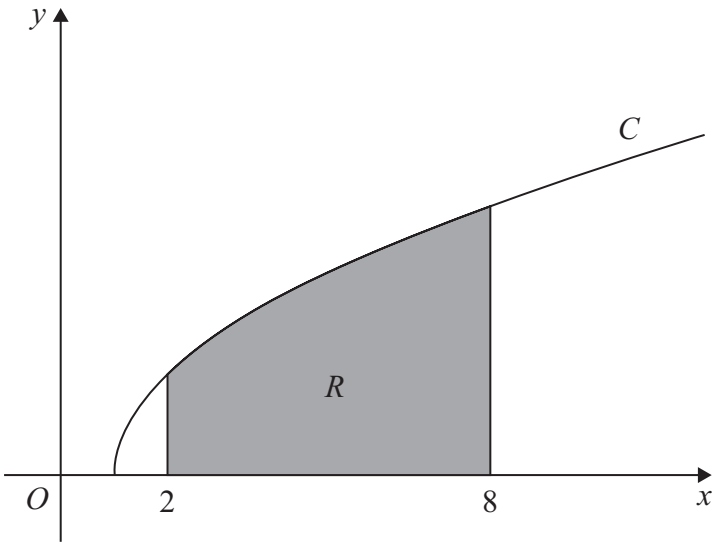

Figure 1

Figure 1 shows a sketch of the curve C with equation

$$y = \frac{5}{3}\sqrt{x-1}$$

The region R, shown shaded in Figure 1, is bounded by C, the line with equation $x = 2$, the x-axis and the line with equation $x = 8$

This region is then rotated through 2π radians about the x-axis to form a solid.

Use algebraic integration to find the exact volume of this solid.

(5)

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