1.

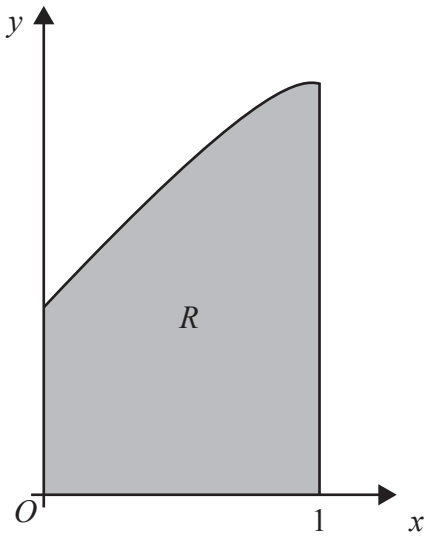


Figure 1

The shaded region R is bounded by the x-axis, the line with equation $x = 1$, the curve with equation $y = 1 + \sqrt{x}$ and the y-axis, as shown in Figure 1. The unit of length on both of the axes is 1 m.

The region R is rotated through 2π radians about the x-axis to form a solid of revolution which is used to model a uniform solid S.

Show, using the model and **algebraic integration**, that

(a) the volume of S is $\frac{17\pi}{6}$ m^3

(3)

(b) the centre of mass of S is $\frac{49}{85}$m from O.

(5)

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Question 1 continued

(Total for Question 1 is 8 marks)