16.

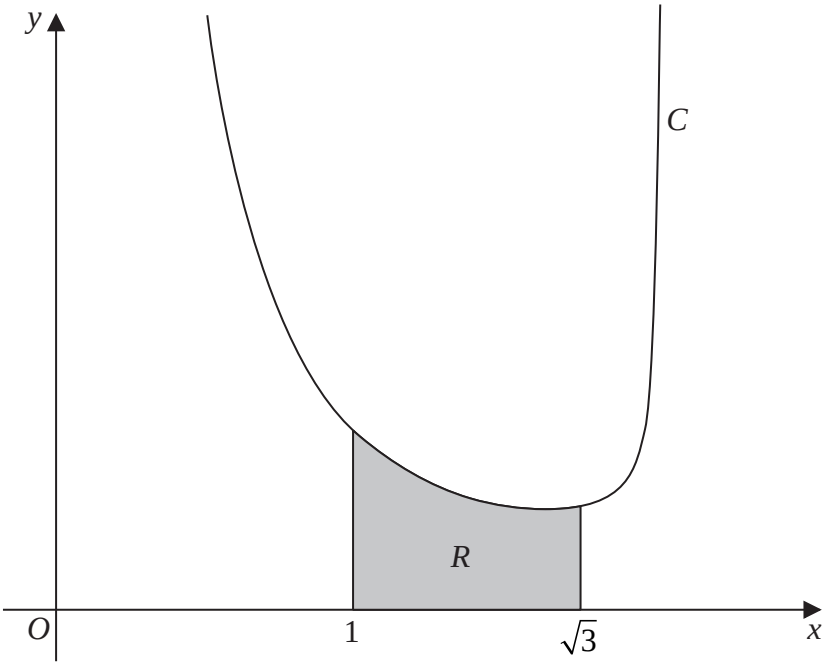

Figure 5

Figure 5 shows a sketch of the curve C with equation

$$y = \frac{1}{x^2\sqrt{4 - x^2}} \qquad 0 < x < 2$$

The region R, shown shaded in Figure 5, is bounded by C, the line with equation $x = 1$, the x-axis and the line with equation $x = \sqrt{3}$

(a) Use the substitution $x = 2\sin u$ to show that the area of R is given by

$$\int_a^b k\,\text{cosec}^2 u\,\text{d}u$$

where a, b and k are constants to be found.

(4)

(b) Hence, using algebraic integration, find the exact area of R.
Give your answer in simplest form.

(3)