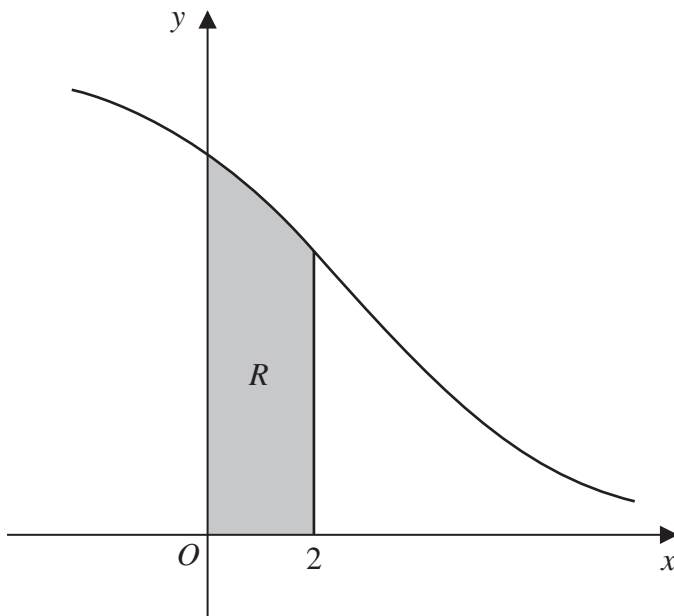


6.



**Figure 3**

Figure 3 shows a sketch of part of the curve with equation

$$y = \frac{6}{e^{\frac{1}{2}x} + 4} \quad x \in \mathbb{R}$$

The finite region  $R$ , shown shaded in Figure 3, is bounded by the curve, the  $y$ -axis, the  $x$ -axis, and the line with equation  $x = 2$

(a) Use the substitution  $u = e^{\frac{1}{2}x}$  to show that the area of  $R$  can be given by

$$\int_a^b \frac{12}{u(u+4)} du$$

where  $a$  and  $b$  are constants to be found.

(3)

(b) Hence use algebraic integration to show that the exact area of  $R$  is  $3 \ln \left( \frac{5e}{e+4} \right)$

(5)