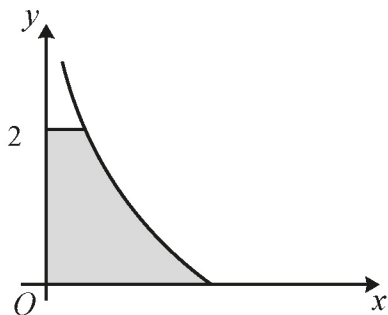


**12** In this question you must show detailed reasoning.



The diagram shows the curve with parametric equations  $x = \frac{2}{(2t+1)^4}$ ,  $y = 2t^2 + 3t$  for  $t \geq 0$ .

The shaded region is enclosed by the curve, the  $x$ -axis, the  $y$ -axis and the line  $y = 2$ .

**(a)** Show that the area of the shaded region is given by  $\int_a^b \frac{8t+6}{(2t+1)^4} dt$ , where  $a$  and  $b$  are constants to be determined.

**[5]**

**(b)** Determine the exact area of the shaded region.

**[6]**