





**Question 1 continued**

**(Total 5 marks)**

**Q1**





**Q2**

**(Total 7 marks)**

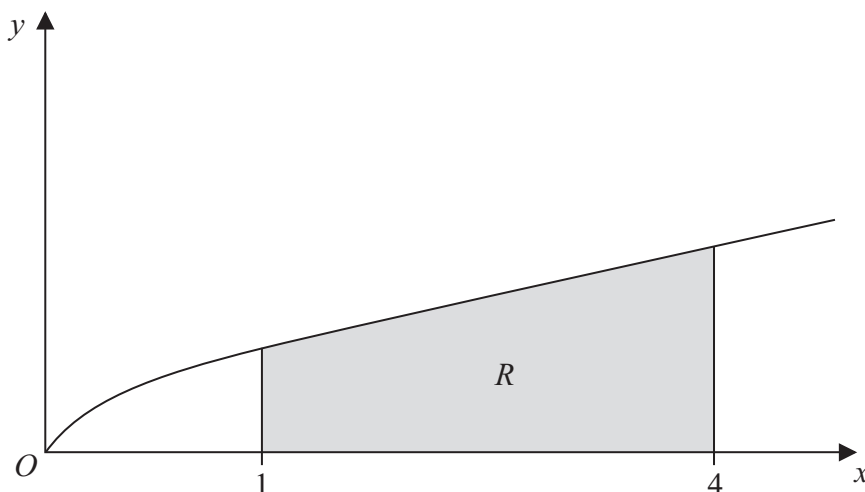




Q3



4.



### Figure 1

Figure 1 shows a sketch of part of the curve with equation  $y = \frac{x}{1 + \sqrt{x}}$ . The finite region  $R$ , shown shaded in Figure 1, is bounded by the curve, the  $x$ -axis, the line with equation  $x = 1$  and the line with equation  $x = 4$ .

- (a) Complete the table with the value of  $y$  corresponding to  $x = 3$ , giving your answer to 4 decimal places.

(1)

$x$	1	2	3	4
$y$	0.5	0.8284		1.3333

- (b) Use the trapezium rule, with all the values of  $y$  in the completed table, to obtain an estimate of the area of the region  $R$ , giving your answer to 3 decimal places.

(3)

- (c) Use the substitution  $u = 1 + \sqrt{x}$ , to find, by integrating, the exact area of  $R$ .

(8)



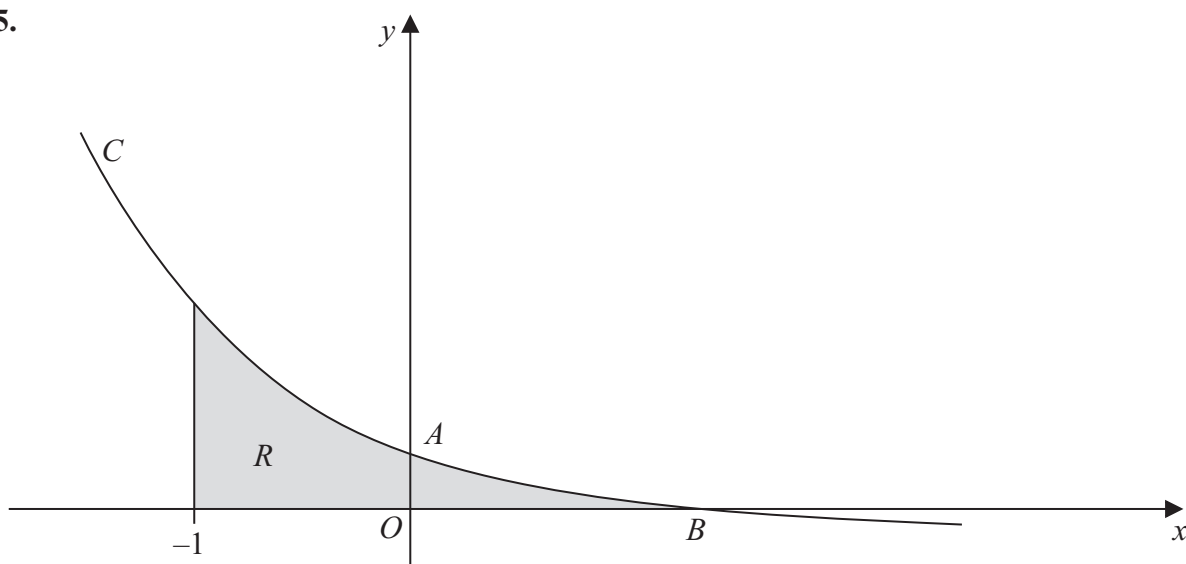






## Q4

5.



**Figure 2**

Figure 2 shows a sketch of part of the curve  $C$  with parametric equations

$$x = 1 - \frac{1}{2}t, \quad y = 2^t - 1$$

The curve crosses the  $y$ -axis at the point  $A$  and crosses the  $x$ -axis at the point  $B$ .

(a) Show that  $A$  has coordinates  $(0, 3)$ . (2)

(b) Find the  $x$  coordinate of the point  $B$ . (2)

(c) Find an equation of the normal to  $C$  at the point  $A$ . (5)

The region  $R$ , as shown shaded in Figure 2, is bounded by the curve  $C$ , the line  $x = -1$  and the  $x$ -axis.

(d) Use integration to find the exact area of  $R$ . (6)

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**Q5**

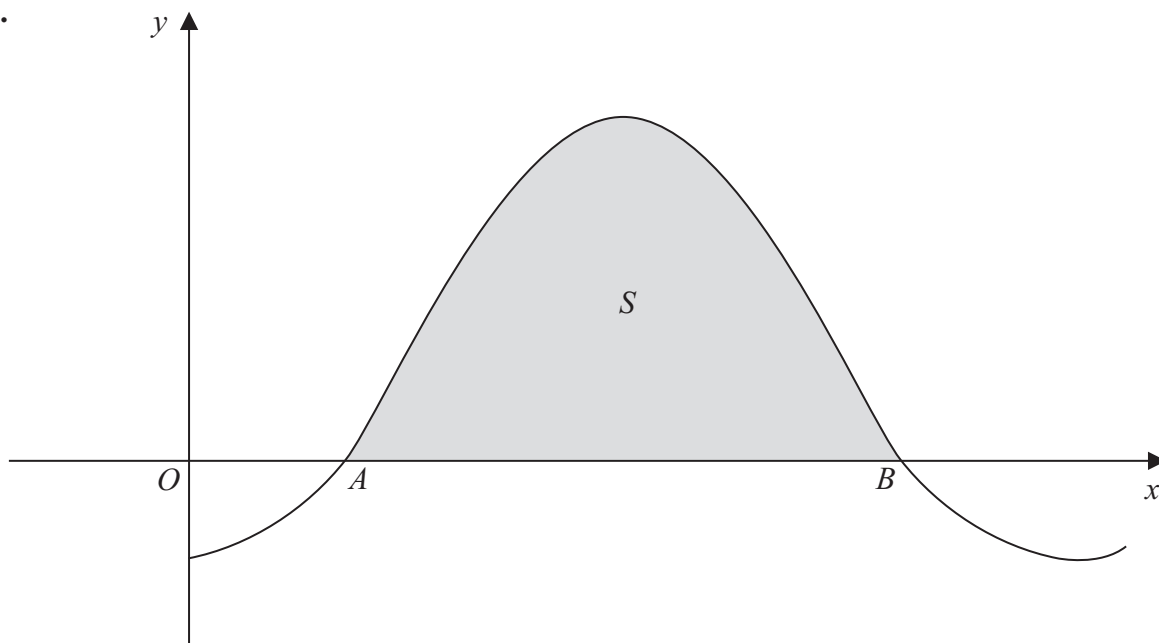


Figure 3 shows a sketch of part of the curve with equation  $y = 1 - 2\cos x$ , where  $x$  is measured in radians. The curve crosses the  $x$ -axis at the point  $A$  and at the point  $B$ .

- The finite region  $S$  enclosed by the curve and the  $x$ -axis is shown shaded in Figure 3. The region  $S$  is rotated through  $2\pi$  radians about the  $x$ -axis.









**Question 6 continued**

**(Total 9 marks)**

**Q6**

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**Question 7 continued**



**Q7**

$$\frac{d\theta}{dt} = \frac{(3 - \theta)}{125}$$
$$\theta = Ae^{-0.008t} + 3$$

(4)

(5)









**Question 8 continued**

**(Total 9 marks)**

Q8

**TOTAL FOR PAPER: 75 MARKS**

**END**

