Finding Areas using Integration 2 - Edexcel Past Exam Questions

1.

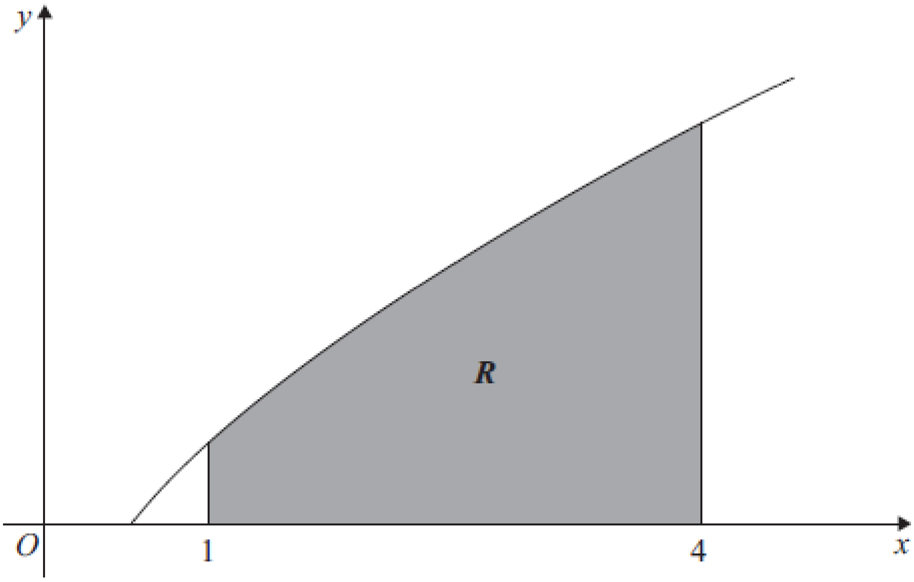

Figure 3

Figure 3 shows a sketch of part of the curve with equation $y = x^{\frac{1}{2}} \ln 2x$.

The finite region R, shown shaded in Figure 3, is bounded by the curve, the x-axis and the lines $x = 1$ and $x = 4$.

(a) Find $\int x^{\frac{1}{2}} \ln 2x \, dx$. **(4)**

(b) Hence find the exact area of R, giving your answer in the form $a \ln 2 + b$, where a and b are exact constants. **(3)**

June 12 Q7(edited)

2.

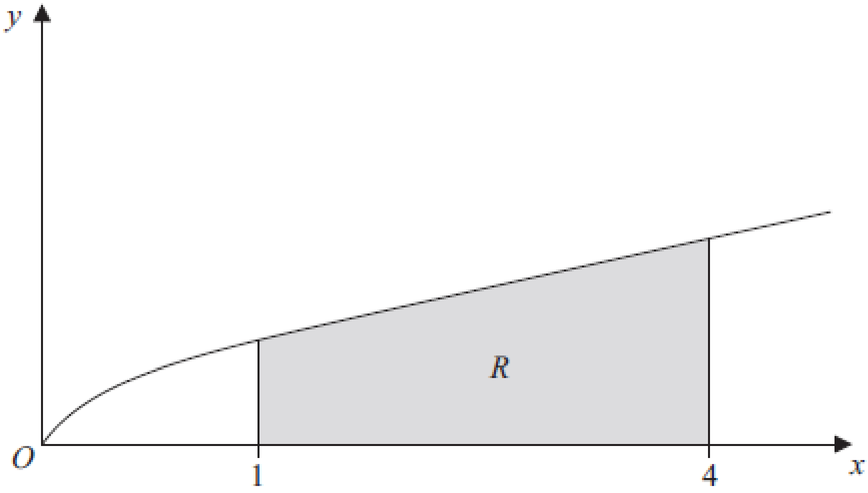

Figure 1

Figure 1 shows a sketch of part of the curve with equation $y = \dfrac{x}{1+\sqrt{x}}$. 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 $x = 4$.

Use the substitution $u = 1 + \sqrt{x}$, to find, by integrating, the exact area of R. **(8)**

Jan 13 Q4 ***(edited)***

3.

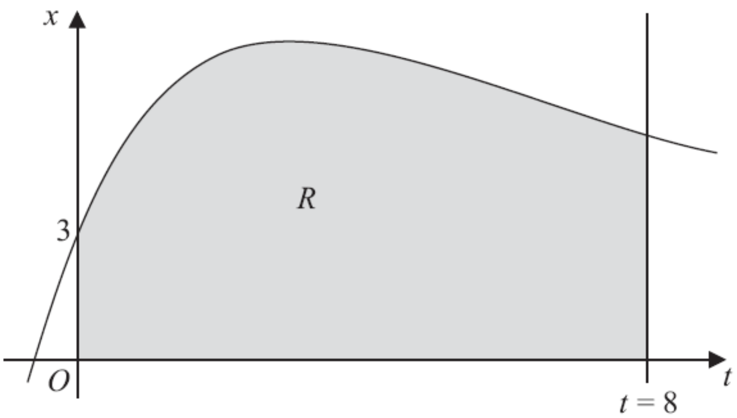

Figure 1

Figure 1 shows part of the curve with equation $x = 4te^{-\frac{1}{3}t} + 3$. The finite region R shown shaded in Figure 1 is bounded by the curve, the x-axis, the t-axis and the line $t = 8$.

Use calculus to find the exact value for the area of R. **(6)**

June 13(R) Q5*(edited)*

4.

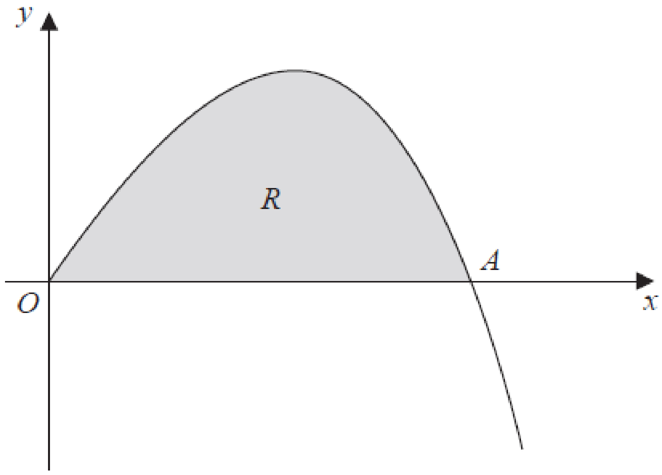

Figure 1

Figure 1 shows a sketch of part of the curve with equation $y = 4x - xe^{\frac{1}{2}x}$, $x \geq 0$.

The curve meets the x-axis at the origin O and cuts the x-axis at the point A.

(a) Find, in terms of ln 2, the x coordinate of the point A. **(2)**

(b) Find $\int xe^{\frac{1}{2}x} \, dx$. **(3)**

The finite region R, shown shaded in Figure 1, is bounded by the x-axis and the curve with equation $y = 4x - xe^{\frac{1}{2}x}$, $x \geq 0$.

(c) Find, by integration, the exact value for the area of R.
Give your answer in terms of ln 2. **(3)**

June 15 Q3

5.

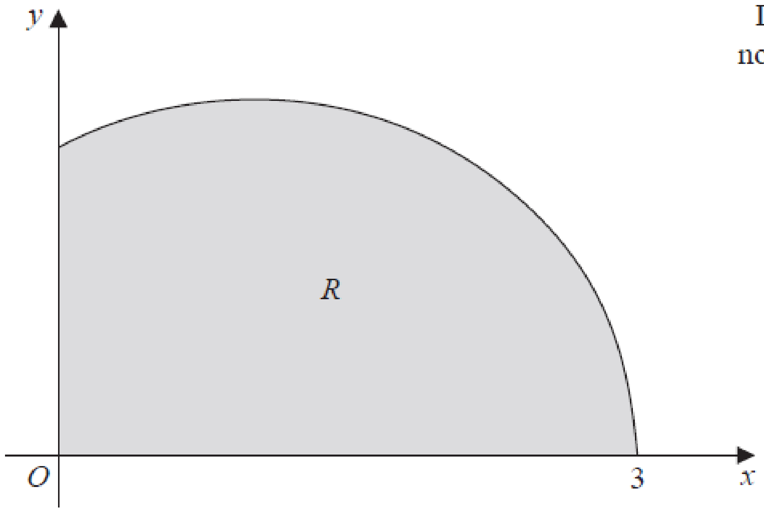

Figure 2

Figure 2 shows a sketch of the curve with equation $y = \sqrt{(3-x)(x+1)}$, $0 \leq x \leq 3$.

The finite region R, shown shaded in Figure 2, is bounded by the curve, the x-axis, and the y-axis.

(a) Use the substitution $x = 1 + 2\sin\theta$ to show that

$$\int_0^3 \sqrt{(3-x)(x+1)}\ \mathrm{d}x = k\int_{-\frac{\pi}{6}}^{\frac{\pi}{2}} \cos^2\theta\ \mathrm{d}\theta,$$

where k is a constant to be determined. **(5)**

(b) Hence find, by integration, the exact area of R. **(3)**

June 15 Q6

6.

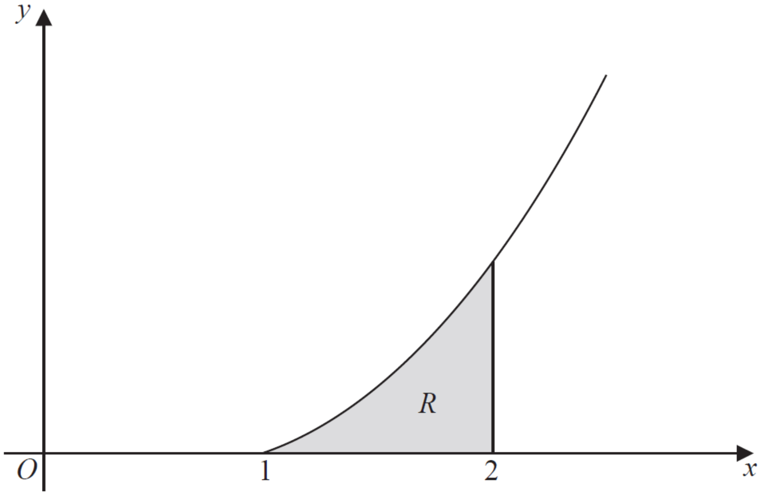

Figure 1

Figure 1 shows a sketch of part of the curve with equation $y = x^2 \ln x, \quad x \geq 1$.

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

Use integration to find the exact value for the area of R. **(5)**

June 16 Q2 ***(edited)***

7.

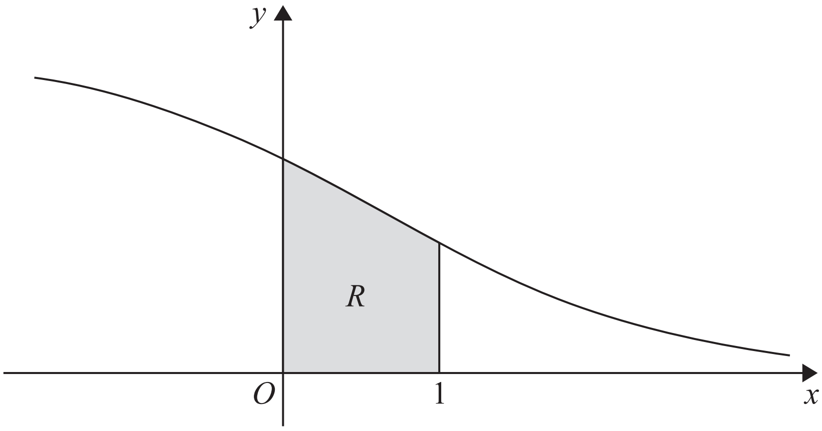

Figure 1

Figure 1 shows a sketch of part of the curve with equation $y = \dfrac{6}{(e^x + 2)}, \quad x \in \mathbb{R}$

The finite region R, shown shaded in Figure 1, is bounded by the curve, the y-axis, the x-axis and the line with equation $x = 1$

(c) Use the substitution $u = e^x$ to show that the area of R can be given by

$$\int_a^b \frac{6}{u(u+2)}\,du$$

where a and b are constants to be determined. **(2)**

(d) Hence use calculus to find the exact area of R.
[*Solutions based entirely on graphical or numerical methods are not acceptable.*] **(6)**

June 17 Q3*(edited)*