Integration by Substitution- Edexcel Past Exam Questions

1. Use the substitution $x = \sin\theta$ to find the exact value of

$$\int_0^{\frac{1}{2}} \frac{1}{(1-x^2)^{\frac{3}{2}}}\,dx.$$ **(7)**

June 05 Q4

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2. Using the substitution $u^2 = 2x - 1$, or otherwise, find the exact value of

$$\int_1^5 \frac{3x}{\sqrt{(2x-1)}}\,dx.$$ **(8)**

Jan 06 Q3

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3. $$I = \int_0^5 e^{\sqrt{(3x+1)}}\,dx.$$

Use the substitution $t = \sqrt{(3x+1)}$ to show that I may be expressed as $\int_a^b kte^t\,dt$, giving the values of a, b and k. **(5)**

Jan 07 Q8*(edited)*

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4. Use the substitution $u = 2^x$ to find the exact value of

$$\int_0^1 \frac{2^x}{(2^x+1)^2}\,dx.$$ **(6)**

June 07 Q2

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5. Using the substitution $x = 2\cos u$, or otherwise, find the exact value of

$$\int_1^{\sqrt{2}} \frac{1}{x^2\sqrt{(4-x^2)}}\,dx.$$ **(7)**

Jan 10 Q8*(edited)*

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6. Using the substitution $u = \cos x + 1$, or otherwise, show that

$$\int_0^{\frac{\pi}{2}} e^{\cos x + 1} \sin x \ \mathrm{d}x = e(e - 1). \qquad \textbf{(6)}$$

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7.
$$I = \int_2^5 \frac{1}{4 + \sqrt{(x - 1)}} \mathrm{d}x.$$

Using the substitution $x = (u - 4)^2 + 1$, or otherwise, and integrating, find the exact value of I.
(8)

Jan 11 Q7 *(edited)*

8.

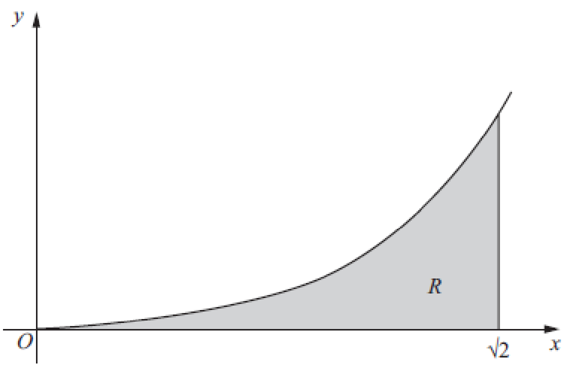

Figure 2

Figure 2 shows a sketch of the curve with equation $y = x^3 \ln(x^2 + 2)$, $x \geq 0$.

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

(*a*) Use the substitution $u = x^2 + 2$ to show that the area of R is

$$\frac{1}{2}\int_2^4 (u - 2)\ln u \ \mathrm{d}u. \qquad \textbf{(4)}$$

(*b*) Hence, or otherwise, find the exact area of R. **(6)**

June 11 Q4*(edited)*
