Integration by Parts - Edexcel Past Exam Questions

1. (*a*) Find $\int x \cos 2x \ \mathrm{d}x$. **(4)**

(*b*) Hence, using the identity $\cos 2x = 2\cos^2 x - 1$, deduce $\int x \cos^2 x \ \mathrm{d}x$. **(3)**

June 07 Q3

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2. (i) Find $\int \ln\left(\frac{x}{2}\right) \mathrm{d}x$. **(4)**

(ii) Find the exact value of $\int_{\frac{\pi}{4}}^{\frac{\pi}{2}} \sin^2 x \ \mathrm{d}x$. **(5)**

Jan 08 Q4

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3. (*a*) Use integration by parts to find $\int x\mathrm{e}^x \ \mathrm{d}x$. **(3)**

(*b*) Hence find $\int x^2\mathrm{e}^x \ \mathrm{d}x$. **(3)**

June 08 Q2

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4. (*a*) Find $\int \tan^2 x \ \mathrm{d}x$. **(2)**

(*b*) Use integration by parts to find $\int \frac{1}{x^3} \ln x \ \mathrm{d}x$. **(4)**

(*c*) Use the substitution $u = 1 + \mathrm{e}^x$ to show that

$$\int \frac{\mathrm{e}^{3x}}{1+\mathrm{e}^x} \ \mathrm{d}x = \frac{1}{2}\mathrm{e}^{2x} - \mathrm{e}^x + \ln(1 + \mathrm{e}^x) + k,$$

where k is a constant. **(7)**

Jan 09 Q6

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5. (*a*) Find $\int \sqrt{(5-x)}\ \mathrm{d}x$. **(2)**

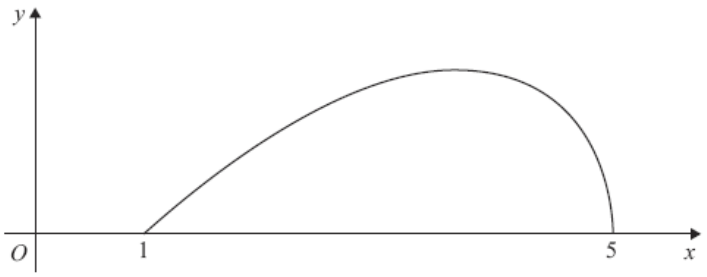

Figure 3

Figure 3 shows a sketch of the curve with equation

$$y = (x-1)\sqrt{(5-x)}, \quad 1 \le x \le 5$$

(*b*) (i) Using integration by parts, or otherwise, find $\int (x-1)\sqrt{(5-x)}\ \mathrm{d}x$. **(4)**

(ii) Hence find $\int_1^5 (x-1)\sqrt{(5-x)}\ \mathrm{d}x$. **(2)**

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6. Use integration by parts to find $\int x \ln x\ \mathrm{d}x$. **(4)**

Jan 10 Q2*(edited)*

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7. $\mathrm{f}(\theta) = 4\cos^2\theta - 3\sin^2\theta$

(*a*) Show that $\mathrm{f}(\theta) = \frac{1}{2} + \frac{7}{2}\cos 2\theta$. **(3)**

(*b*) Hence, using calculus, find the exact value of $\int_0^{\frac{\pi}{2}} \theta\ \mathrm{f}(\theta)\ \mathrm{d}\theta$. **(7)**

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8. Use integration to find the exact value of $\int_0^{\frac{\pi}{2}} x\sin 2x\ \mathrm{d}x$. **(6)**

Jan 11 Q1
