Integration By Parts (From OCR 4724)

Q1, (Jun 2005, Q2)

Evaluate $\int_0^{\frac{1}{2}\pi} x\cos x\,\mathrm{d}x$, giving your answer in an exact form. [5]

Q2, (Jan 2006, Q4)

(i) Use integration by parts to find $\int x\sec^2 x\,\mathrm{d}x$. [4]

(ii) Hence find $\int x\tan^2 x\,\mathrm{d}x$. [3]

Q3, (Jan 2007, Q2)

Find the exact value of $\int_1^2 x\ln x\,\mathrm{d}x$. [5]

Q4, (Jun 2007, Q2)

Find the exact value of $\int_0^1 x^2\mathrm{e}^x\,\mathrm{d}x$. [6]

Q5, (Jan 2010, Q8)

(i) State the derivative of $\mathrm{e}^{\cos x}$. **[1]**

(ii) Hence use integration by parts to find the exact value of

$$\int_0^{\frac{1}{2}\pi} \cos x\sin x\,\mathrm{e}^{\cos x}\,\mathrm{d}x.$$ **[6]**

Q6, (Jun 2010, Q9i)

Find $\int (x+\cos 2x)^2\,\mathrm{d}x$. **[9]**

Q7, (Jun 2013, Q2)

Find $\int x^8\ln(3x)\,\mathrm{d}x$. **[5]**

Q8, (Jun 2014, Q8)

(i) Use division to show that $\frac{t^3}{t+2} \equiv t^2-2t+4-\frac{8}{t+2}$. **[3]**

(ii) Find $\int_1^2 6t^2\ln(t+2)\,\mathrm{d}t$. Give your answer in the form $A + B\ln 3 + C\ln 4$. **[6]**

Q9, (Jun 2016, Q4)

Find the exact value of $\int_1^8 \frac{1}{\sqrt[3]{x}}\ln x\,\mathrm{d}x$, giving your answer in the form $A\ln 2 + B$, where A and B are constants to be found. **[5]**
