

Example

$$\int x e^x dx \quad \text{Let } u = x \quad \text{and} \quad \frac{dv}{dx} = e^x$$

$$\text{Then } \frac{du}{dx} = 1 \quad \text{and} \quad v = e^x$$

$$\begin{aligned} \therefore \int x e^x dx &= x e^x - \int e^x \times 1 dx \\ \begin{array}{cccc} \uparrow \uparrow & \uparrow \uparrow & \uparrow & \uparrow \\ u \frac{dv}{dx} & u v & v & \frac{du}{dx} \end{array} & \\ &= x e^x - e^x + c \end{aligned}$$

Type 6 Using partial fractions

Example

$$\begin{aligned} \int \frac{2+3x}{(1+x)(1+2x)} dx &= \int \frac{1}{1+x} + \frac{1}{1+2x} dx && \text{(working omitted)} \\ &= \ln(1+x) + \frac{1}{2} \ln(1+2x) + c \end{aligned}$$

EXERCISE 8

Section A Find the following.

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|--------------------------------------|--------------------------------------|---------------------------------|
| 1 $\int (x+2)^3 dx$ | 2 $\int \cos 3x dx$ | 3 $\int 4e^x dx$ |
| 4 $\int \frac{1}{x} dx$ | 5 $\int \frac{1}{x^2} dx$ | 6 $\int \frac{2}{x^2-1} dx$ |
| 7 $\int x \cos x dx$ | 8 $\int \frac{5}{5x-1} dx$ | 9 $\int \sec^2 2x dx$ |
| 10 $\int \frac{2x}{x^2+a} dx$ | 11 $\int x(x+4)^2 dx$ | 12 $\int x e^{5x} dx$ |
| 13 $\int \frac{\cos 3x}{\sin 3x} dx$ | 14 $\int e^{3x+2} dx$ | 15 $\int x^3 \sqrt{x^4-1} dx$ |
| 16 $\int \frac{5}{x-7} dx$ | 17 $\int \frac{5x+7}{(x^2+3x+2)} dx$ | 18 $\int \cos^2 x dx$ |
| 19 $\int x \ln x dx$ | 20 $\int \frac{x+1}{x} dx$ | 21 $\int \frac{1}{1+x} dx$ |
| 22 $\int x^2 e^x dx$ | 23 $\int \sin(3-4x) dx$ | 24 $\int \frac{4}{\cos^2 x} dx$ |
| 25 $\int (e^x - e^{-x})^2 dx$ | 26 $\int \frac{x^2+3x+1}{x} dx$ | 27 $\int \tan x dx$ |
| 28 $\int \tan^2 x dx$ | 29 $\int x(x^2+1)^3 dx$ | 30 $\int x \sin 2x dx$ |