

Section 4: Integration by parts

Exercise level 2

1. Evaluate $\int_0^3 \frac{x}{\sqrt{1+x}} dx$

(i) using integration by parts with $u = x$ and $\frac{dv}{dx} = (1+x)^{-1/2}$

(ii) using the substitution $u = 1 + x$.

2. Evaluate (i) $\int_1^2 x^3 \ln 2x dx$

(ii) $\int_1^2 \ln x dx$

3. By writing $\tan x = \frac{\sin x}{\cos x}$, find $\int \tan x dx$. Use the result to find $\int x \sec^2 x dx$.

4. Find the area between the x -axis and the graph $y = xe^{-x}$ between $x = 0$ and $x = 1$.

5. Find the area between the x -axis and the graph $y = x \sin 2x$ between $x = 0$ and $x = \frac{\pi}{2}$.

6. Use appropriate methods to find

(i) $\int xe^{3x} dx$

(ii) $\int x^2 e^{x^3} dx$

(iii) $\int x^2 e^{3x} dx$