Integration by parts

6 questions | 12 marks

Equivalent correct methods earn the corresponding marks.

1. Find $\int x\cos x\,dx$. [2 marks]

Use u=x, v=sin x.

Subtract the integral of sin x.

Answer: $x\sin x + \cos x + C$.

2. Find $\int x\sin 2x\,dx$. [2 marks]

Use v=-cos2x/2.

Integrate the remaining cosine term.

Answer: $-x\cos 2x/2 + \sin 2x/4 + C$.

3. Find $\int x^2 e^x\,dx$. [2 marks]

Apply parts with u=x squared.

Apply parts again to the remaining x exp(x) term.

Answer: $e^x(x^2 - 2x + 2) + C$.

4. Find $\int x\ln x\,dx$ for x>0. [2 marks]

Use u=ln x, dv=x dx.

The remaining integral is x/2.

Answer: $(x^2/2)\ln x - x^2/4 + C$.

5. Evaluate $\int_0^1 xe^x\,dx$. [2 marks]

Use antiderivative (x-1)exp(x).

The endpoint values are 0 and -1.

Answer: 1.

6. Find $\int \arctan x\,dx$. [2 marks]

Use u=arctan x, dv=dx.

The remaining integral is x/(1+x squared).

Answer: $x\arctan x - \frac{1}{2}\ln(1+x^2) + C$.