Further antiderivatives

6 questions | 12 marks

Equivalent correct methods earn the corresponding marks.

1. Find $\int x^{\frac{3}{2}}\,dx$ for $x > 0$. [2 marks]

Increase the exponent to $\frac{5}{2}$.

Divide by $\frac{5}{2}$.

Answer: $\frac{2}{5}x^{\frac{5}{2}} + C$.

2. Find $\int (2e^{3x} + 4)\,dx$. [2 marks]

Divide the exponential coefficient by 3.

Integrate 4 as 4x.

Answer: $\frac{2}{3}e^{3x} + 4x + C$.

3. Find $\int \cos(3x)\,dx$. [2 marks]

Sine differentiates to cosine.

The factor $\frac{1}{3}$ cancels the inner derivative 3.

Answer: $\frac{1}{3}\sin(3x) + C$.

4. Find $\int\left(\frac{5}{x}-\frac{2}{x^3}\right)dx$. [2 marks]

Use the logarithm rule for $\frac{1}{x}$.

Use the power rule for $-2x^{-3}$.

Answer: $5\ln|x|+x^{-2}+C,\ x\neq 0$.

5. Given $F'=6x$ and $F(1)=5$, find F. [2 marks]

Integrate to $3x^2+C$.

Use $3+C=5$.

Answer: $F=3x^2+2$.

6. Check whether $2\sqrt{x}+C$ is an antiderivative of $\frac{1}{\sqrt{x}}$ for $x>0$. [2 marks]

Differentiate $2x^{\frac{1}{2}}$.

The result is $x^{-\frac{1}{2}}$.

Answer: Yes.