Further antiderivatives

6 questions | 12 marks

Equivalent correct methods earn the corresponding marks.

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

Increase the exponent to 5/2.

Divide by 5/2.

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

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 1/3 cancels the inner derivative 3.

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

4. Find $\int(5/x - 2/x^3)\,dx$. [2 marks]

Use the logarithm rule for 1/x.

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

Answer: $5\ln|x| + x^{-2} + C$, x not zero.

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 $1/\sqrt{x}$ for x>0. [2 marks]

Differentiate $2x^{1/2}$.

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

Answer: Yes.