Antiderivatives and constants

6 questions | 18 marks

Equivalent correct methods earn the corresponding marks.

1. Find $\int 4x\,dx$. [3 marks]

Raise the power to 2, then divide $4x^2$ by 2.

Add C.

Answer: $2x^2 + C$

2. Find $\int (9x^2 + 2)\,dx$. [3 marks]

$9x^2$ integrates to $3x^3$; 2 integrates to $2x$.

Answer: $3x^3 + 2x + C$

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

Integrate each power separately and add C.

Answer: $\frac{x^4}{4} - \frac{5x^2}{2} + C$

4. Find $\int 7\,dx$ and explain the variable in the answer. [3 marks]

The derivative of $7x$ is 7; the integral is with respect to x.

Answer: $7x + C$

5. A student claims $3x^2$ is an antiderivative of $3x$. Check and correct the claim. [3 marks]

The derivative of $3x^2$ is $6x$, not $3x$.

Divide by 2 before differentiating back.

Answer: Incorrect; $\frac{3x^2}{2} + C$ is the family.

6. For $f(x) = 2x + 1$, give two different antiderivatives and explain their relationship. [3 marks]

Both differentiate to $2x + 1$.

They differ by a constant.

Answer: For example $x^2 + x$ and $x^2 + x + 4$.