

Questions: Introduction to integration

Donald Campbell

Summary

A selection of questions for the study guide on introduction to integration.

*Before attempting these questions, it is highly recommended that you read [Guide: Introduction to integration](#)

Q1

Using the power rule and laws of indices (as appropriate), find the following indefinite integrals.

$$1.1. \int x^4 dx$$

$$1.2. \int 2x dx$$

$$1.3. \int 7x^5 dx$$

$$1.5. \int -5 dt$$

Q2

Use the power rule to integrate the following expressions, applying the laws of indices where necessary.

$$2.1. \int \frac{3}{y^3} dy$$

$$2.2. \int 6x^{-4} dx$$

$$2.3. \int -\frac{2}{x^5} dx$$

$$2.4. \int \frac{8}{3x^6} dx$$

$$2.5. \int -\frac{7}{2z^7} dz$$

Q3

The following expressions contain fractional indices of x . Find these integrals.

$$3.1. \quad \int x^{1/3} dx$$

$$3.2. \quad \int 3t^{-2/3} dt$$

$$3.3. \quad \int \frac{4x^{1/4}}{3} dx$$

$$3.4. \quad \int \frac{2}{5x^{1/3}} dx$$

$$3.5. \quad \int \frac{5}{6y^{-4/3}} dy$$

Q5

Integrate the following functions with respect to x .

$$5. \quad \int e^{2x} dx$$

$$6. \quad \int -3e^{-3x} dx$$

$$7. \quad \int 2e^{11x} dx$$

$$8. \quad \int \frac{4}{x} dx$$

$$9. \quad \int -\frac{5}{3x} dx$$

$$5.1. \quad \int \cos(x) dx$$

$$5.2. \quad \int \sin(2x) dx$$

$$5.3. \quad \int \frac{5}{6} \cos(x) dx$$

$$5.4. \quad \int \cos(3x) dx$$

$$5.5. \quad \int \sin\left(\frac{x}{3}\right) dx$$

Q1

Evaluate the following definite integrals with respect to x .

$$1.1. \int_1^4 2 \, dx$$

$$1.2. \int_{-2}^2 3x \, dx$$

$$1.4. \int_2^4 2x^3 \, dx$$

Q2

By using an appropriate substitution, evaluate the following definite integrals with respect to x .

$$2.1. \int_1^{27} \frac{4}{\sqrt[3]{x}} \, dx$$

Q3

Evaluate the following trigonometric definite integrals with respect to x , using the graphs of $\sin(ax)$ and $\cos(bx)$ to help you.

$$3. \int_0^{\ln(3)} 4e^x \, dx$$

$$4. \int_0^5 e^{-3x} \, dx$$

$$5. \int_1^2 -4e^{4x} \, dx$$

$$6. \int_1^2 \frac{2}{x} \, dx$$

$$7. \int_1^{e^3} -\frac{4}{x} \, dx$$

$$8. \int_{e^3}^{e^9} \frac{9}{5x} \, dx$$

$$3.1. \int_0^{\pi/2} \sin(x) \, dx$$

$$3.2. \int_0^{\pi} \cos(x) dx$$

$$3.6. \int_0^{\pi/4} \sin(2x) dx$$

Q4

Evaluate the following trigonometric definite integrals with respect to x , using the graphs of $\sin(ax)$ and $\cos(bx)$ to help you.

$$4.1. \int_0^{\pi/6} \cos(2x) dx$$

$$4.2. \int_{-\pi/4}^0 \sin(3x) dx$$

[After attempting the questions above, please click this link to find the answers.](#)

Version history and licensing

v1.0: initial version created 05/25 by Donald Campbell as part of a University of St Andrews VIP project.

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