

# Questions: Introduction to integration

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

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

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

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

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

### Q5

Integrate the following functions with respect to  $x$ .

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

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

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

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

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

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

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

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

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

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

## 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.](#)

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## 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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