Questions: Definite integration

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Summary

A selection of questions for the study guide on definite integration.

Before attempting these questions, it is highly recommended that you read [Guide: Definite integration].

Q1

Evaluate the following definite integrals with respect x.

1.1. $\int_1^4 2 \, \mathrm{d}x$

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

1.3. $\int_{-2}^1 (3 - 5x) \, \mathrm{d}x$

1.4. $\int_2^4 2x^3 \, \mathrm{d}x$

1.5. $\int_0^2 (4x^2 - 3x + 1) \, \mathrm{d}x$

1.6. $\int_{-3}^{-1} (6x^4 + 1) \, \mathrm{d}x$

1.7. $\int_{-2}^2 (x - 2)(2x + 1) \, \mathrm{d}x$

1.8. $\int_0^3 x^2 (3x - 2) \, \mathrm{d}x$

Q2

Evaluate the following definite integrals with respect to x, using the power rule and the chain rule (or an appropriate substitution $u = ax + b$).

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

2.2. $\int_1^4 (2\sqrt{x} + x^2)\,\mathrm{d}x$

2.3. $\int_1^4 (x^{3/2} - x^{-1/2})\,\mathrm{d}x$

2.4. $\int_0^3 (2x^3 - 7x + 5)\,\mathrm{d}x$

2.5. $\int_1^4 (6x^{-2} - 2x^{1/2})\,\mathrm{d}x$

2.6. $\int_0^1 (2x + 1)^3\,\mathrm{d}x$

2.7. $\int_{-1}^1 (4 - 3x)^2\,\mathrm{d}x$

2.8. $\int_0^2 (1 + x)^3\,\mathrm{d}x$

2.9. $\int_1^4 \left(\frac{x}{2} - 3\right)^2\,\mathrm{d}x$

2.10. $\int_{-1}^1 (2x + 3)^2\,\mathrm{d}x$

Q3

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

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

3.2. $\int_0^{\pi} \cos(x)\,\mathrm{d}x$

3.3. $\int_{\pi/2}^{\pi} \sin(x)\,\mathrm{d}x$

3.4. $\int_{\pi}^{2\pi} \sin(x)\,\mathrm{d}x$

3.5. $\int_0^{3\pi/2} \sin(x)\,\mathrm{d}x$

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

3.7. $\displaystyle\int_0^{\pi} \sin(2x)\,\mathrm{d}x$

3.8. $\displaystyle\int_{\pi/4}^{3\pi/2} \cos(2x)\,\mathrm{d}x$

3.9. $\displaystyle\int_{\pi/4}^{\pi/2} \cos(2x)\,\mathrm{d}x$

3.10. $\displaystyle\int_0^{4\pi} \cos\left(\frac{x}{2}\right)\,\mathrm{d}x$

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. $\displaystyle\int_0^{\pi/6} \cos(2x)\,\mathrm{d}x$

4.2. $\displaystyle\int_{-\pi/4}^{0} \sin(3x)\,\mathrm{d}x$

4.3. $\displaystyle\int_0^{\pi/3} (\sin(x)+\cos(x))\,\mathrm{d}x$

4.4. $\displaystyle\int_{\pi/6}^{\pi/2} \cos\left(4x-\frac{\pi}{3}\right)\,\mathrm{d}x$

4.5. $\displaystyle\int_{-\pi/6}^{\pi/6} \sin(x)\,\mathrm{d}x$

4.6. $\displaystyle\int_0^{\pi/2} \cos\left(2x+\frac{\pi}{6}\right)\,\mathrm{d}x$

4.7. $\displaystyle\int_{-\pi/3}^{\pi/3} \sin(5x)\,\mathrm{d}x$

4.8. $\displaystyle\int_{\pi/6}^{\pi/4} (\cos(x)-\sin(x))\,\mathrm{d}x$

4.9. $\displaystyle\int_0^{\pi/4} \cos(6x)\,\mathrm{d}x$

4.10. $\displaystyle\int_{-\pi/6}^{\pi/6} \sin\left(3x-\frac{\pi}{4}\right)\,\mathrm{d}x$

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.