Anti-derivatives, definite integrals and approximation

Learn and practise | Free preview

A sample from this topic. The complete topic collection contains three different resources and worked solutions.

Read the worked example, then show each step in the practice questions. Show the mathematical steps. A calculator, graphing tool or CAS may be used to check results where useful.

What you will practise

• Anti-differentiation, definite integrals and trapezium rule

Useful starting skills: Mathematical Methods Units 1–2 functions, algebra, probability and introductory calculus.

Reverse known derivatives to find anti-derivatives. For f(ax+b), account for the inner linear gradient; check by differentiating your answer.

The fundamental theorem evaluates a definite integral using F(b)-F(a). A trapezium approximation replaces each curve section with a line joining the endpoint heights.

Worked example

Find $\int 6x^2\,dx$ and evaluate $\int_0^2 6x^2\,dx$.

An anti-derivative is $2x^3$; evaluate $2\times 8-0$.

Answer: $2x^3+C$; 16.

Try it yourself

Name: _____ Date: _____

1. Integrate$(2\ x+1)^3$.

2. Integrate $e^{(3\ x)}$.

Answers and explanations

Check the method as well as the final answer. An alternative correct method is also valid.

1. $(2x+1)^4/8+C$.

Reverse chain rule: derivative of the answer multiplies by 4 and 2.

2. $e^{(3x)}/3+C$.

Divide by inner gradient 3.

Curriculum reference: Mathematical Methods Units 3–4 — Anti-differentiation, definite integrals and trapezium rule

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