Differentiation rules and derivative graphs

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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. Attempt the reasoning and exact calculations by hand. Technology may check a result but cannot replace the written argument.

What you will practise

• Differentiation of elementary functions and combinations

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

Combine basic derivatives with the chain, product and quotient rules. A nested function requires multiplying by the derivative of the inner function.

A derivative graph records slopes of the original graph. Positive values indicate increase, negative values decrease, and zeros locate candidates for stationary points.

Worked example

Differentiate $f(x)=(3x+1)^4$.

Outer derivative $4(3x+1)^3$

multiply by inner derivative 3.

Answer: $12(3x+1)^3$.

Try it yourself

Name: _____ Date: _____

1. Differentiate $x^2 e^x$.

2. Differentiate $\ln(2x+5)$ on its real domain.

Answers and explanations

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

1. $e^x(x^2+2\ x)$.

Product rule: $2\ x\ e^x+x^2\ e^x$.

2. $2/(2\ x+5)$, $x>-5/2$.

Chain rule and positive logarithm input.

Curriculum reference: Mathematical Methods Units 3–4 — Differentiation of elementary functions and combinations

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