Limits and derivative estimates

Key knowledge | Free preview

Learning target: Understand the derivative limit, central-difference estimate, gradient function and instantaneous rate interpretation.

A derivative is a limit of average rates, not a quotient obtained by substituting zero into a zero denominator. Simplify a difference quotient first, then consider its limiting value. A central difference uses points on both sides and is an approximation unless the function makes it exact. Compare results and keep the step size explicit.

Try the mathematics

Task 1. For $f(x)=x^2$, simplify $[f(2+h)-f(2)]/h$ and find its limit as $h\to 0$. Compare with the central difference $[f(2+h)-f(2-h)]/(2h)$.

Continue with the full worksheet

The complete resource has 2 focused task sets and substantive worked solutions. Use an exercise book or print the A4 worksheet. This preview shows the first task without its full solution.

Find this resource: https://resources.aspiretopowerlearning.com.au/vce/skills/aspire-mm-u2-o1-kk-08/

Study-design reference

VCE Mathematics Study Design 2023-2027, version 1.1 (November 2022). Mathematical Methods; Unit 2; Outcome 1; Key knowledge; bullet 8; p. 55.

The learning target is a concise paraphrase. Aspire reference: aspire-mm-u2-o1-kk-08. This is an internal identifier, not an official VCAA code.

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