AP Calculus BC

Common Mistakes · 常见错误

This sheet covers what BC adds to AB, where BC-only points are lost: convergence tests used without their conditions, endpoints left untested, and the ½ dropped from a polar area. The shared calculus errors are on the AB sheet. 本册只列 *BC* 新增内容的常见错误。

Series and convergence

Concluding convergence because the terms approach zero. That is necessary, not sufficient – the harmonic series is the counter-example.

Naming a test without checking its conditions. The alternating series test needs terms decreasing in magnitude AND approaching zero.

Finding the radius of convergence and not testing the ENDPOINTS separately. They are usually worth their own point.

Using the ratio test and stopping when the limit is 1, without saying that the test is inconclusive there.

Confusing absolute with conditional convergence, or claiming a conditionally convergent series can be rearranged freely.

Applying the alternating series error bound to a non-alternating series, or forgetting it bounds by the FIRST OMITTED term.

Writing a Taylor series without saying about which point it is centred.

Parametric, polar and vectors

Computing dy/dx for a parametric curve as (dy/dt) × (dx/dt) instead of the quotient.

Confusing speed with velocity. Speed is the magnitude of the velocity vector – a scalar, and always non-negative.

Omitting the ½ from the polar area integral $\frac{1}{2}r^2 d\theta$.

Integrating a polar area over the wrong θ interval, or over the whole circle when the curve traces twice.

Forgetting that arc length needs the square root of the sum of squares of BOTH derivatives.

Advanced integration and differential equations

Applying integration by parts and dropping the minus sign before the second integral.

Evaluating an improper integral without writing it as a limit. The limit notation is itself a scored step.

Saying an improper integral 'equals infinity' rather than that it diverges.

Solving a logistic equation and not identifying the carrying capacity, or forgetting that growth is fastest at half of it.

Using Euler's method with the step size in the wrong place, or taking one step when the interval requires several.