EngineeringRise

Continuity and differentiability

Formulas and units, JEE Main. Status: Reviewed on 2026-11-20.

Result	Formula	Units or note
Continuity at a	limit (x -> a-) f = limit (x -> a+) f = f(a) Valid when: f defined at a and both one-sided limits exist	same units as f
Derivative at a	f prime(a) = limit (h -> 0) [f(a + h) - f(a)]/h Valid when: the limit exists and f defined near a	units of f per unit of x
Right and left derivatives	R f prime(a) from h > 0; L f prime(a) = limit of [f(a) - f(a - h)]/h, h > 0 Valid when: one-sided limits exist; h > 0 in both formulas	units of f per unit of x
Differentiable implies continuous	differentiable at a => continuous at a (converse false) Valid when: f is a function of one variable defined near a	not applicable
Corner of a modulus	|g(x)| has a corner where g = 0 and g prime is not 0; slope jump = 2|g prime| Valid when: g differentiable at the zero of g, with g prime not 0	units of slope
Greatest integer	[x] is discontinuous at every integer; [x] + [-x] = 0 at integers, -1 elsewhere Valid when: x real; [x] is the greatest integer not above x	dimensionless
Smooth join	pieces join smoothly at a if values and derivatives agree at a Valid when: pieces are continuous and differentiable on their sides of a	not applicable

Full lesson with worked examples:
https://www.engineeringrise.in/learn/learn/jee-main/mathematics/limits-continuity-and-differentiability/continuity-and-differentiability

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