



ChapterNotes

chapternotes.in · free NEET & JEE prep

CHAPTER NOTES

Continuity and Differentiability

Class 12 Notes — CBSE Maths

Chapter 5

- ✓ Chapter-wise notes & important questions
- ✓ Free gamified practice app — streaks, levels, revision
- ✓ Free mock & prediction papers with answer keys

Source: <https://chapternotes.in/cbse/class-12-maths/continuity-and-differentiability-class-12-notes/>



Scan for free practice,
mocks & more notes

Continuity and Differentiability Class 12 Notes — CBSE Maths Chapter 5

Chapter 5 — **Continuity and Differentiability** — is one of the most important chapters carrying **8-10 marks**. Master derivatives of composite, implicit, parametric, and logarithmic functions, plus Rolle's and Mean Value theorems.

Key Concepts

Continuity

$f(x)$ is continuous at $x = a$ if: $\lim_{x \rightarrow a} f(x) = f(a)$
i.e., $LHL = RHL = f(a)$

Differentiation Rules

Chain Rule: $d/dx[f(g(x))] = f'(g(x)) \cdot g'(x)$

Product Rule: $d/dx[uv] = u'v + uv'$

Quotient Rule: $d/dx[u/v] = (u'v - uv')/v^2$

Standard Derivatives:

$d/dx(x^n) = nx^{n-1}$ | $d/dx(e^x) = e^x$ | $d/dx(a^x) = a^x \ln a$

$d/dx(\ln x) = 1/x$ | $d/dx(\sin x) = \cos x$ | $d/dx(\cos x) = -\sin x$

$d/dx(\tan x) = \sec^2 x$ | $d/dx(\sec x) = \sec x \tan x$

$d/dx(\sin^{-1}x) = 1/\sqrt{1-x^2}$ | $d/dx(\tan^{-1}x) = 1/(1+x^2)$

$d/dx(\cos^{-1}x) = -1/\sqrt{1-x^2}$

Special Differentiation Techniques

Implicit: Differentiate both sides w.r.t. x , collect dy/dx terms

Example: $x^2 + y^2 = 25 \rightarrow 2x + 2y(dy/dx) = 0 \rightarrow dy/dx = -x/y$

Parametric: If $x = f(t)$, $y = g(t)$, then $dy/dx = (dy/dt)/(dx/dt)$

Logarithmic: Take $\ln$ of both sides, then differentiate

Used for: x^x , $x^{\sin x}$, $(\sin x)^{\cos x}$ type functions

Second Order Derivatives

$d^2y/dx^2 = d/dx(dy/dx)$ — differentiate the first derivative again

Rolle's Theorem

If f is continuous on $[a,b]$, differentiable on (a,b) , and $f(a) = f(b)$, then there exists $c \in (a,b)$ such that $f'(c) = 0$

Mean Value Theorem (Lagrange's)

If f is continuous on $[a,b]$ and differentiable on (a,b) , then there exists $c \in (a,b)$ such that:
 $f'(c) = [f(b) - f(a)]/(b - a)$

Quick Revision Points

- Continuity: $LHL = RHL = f(a)$
- Every differentiable function is continuous, but not vice versa ($|x|$ at $x=0$)
- Chain rule for composite; log differentiation for variable exponents
- Parametric: $dy/dx = (dy/dt)/(dx/dt)$
- Rolle's: $f(a)=f(b) \rightarrow f'(c)=0$; MVT: $f'(c) = [f(b)-f(a)]/(b-a)$

← Previous

Next: Applications of Derivatives →



Got this PDF from a friend?

Everything here is free at **chapternotes.in** — 134 chapters of notes, a gamified practice app, and full NEET mock & prediction papers.



Scan for free practice, mocks & more notes