

Second Order Derivative

Differentiate the derivative again

$$y = f(x)$$

$$\frac{dy}{dx} = f'(x)$$

$$\frac{d^2y}{dx^2} = f''(x)$$

Second Derivative $\neq$ Square of the First

$$d^2y/dx^2 \neq (dy/dx)^2$$

$$\frac{d^2y}{dx^2} = \frac{d}{dx} \left(\frac{dy}{dx} \right)$$

Different Symbols, Same Idea


$$\frac{d^2 y}{dx^2}$$

$$f''(x)$$

$$y''$$

$$D^2 y$$

Each represents the second derivative.



**You've Learned the Theory.
Let's Test Them Now.**

$$E=mc^2$$



Turn theory into marks with **unlimited MCQs, smart analysis, and focused revision.**

Practice Now



At prep.topall.app

Key Highlights

- » Free Study Material, Videos & Infographics
- » Push Your Limits with Level-Based Challenges
- » Climb the Leaderboard Among Fellow Aspirants
- » Practice Unlimited MCQs for NEET & JEE
- » Get Clear Explanations, Not Just Marks
- » Track Your Performance Smarter



Example: $y = x^3 + \tan x$

First derivative:

$$\frac{dy}{dx} = 3x^2 + \sec^2 x$$



Differentiate again:

$$\frac{d^2y}{dx^2} = 6x + 2\sec^2 x \tan x$$

Example: $y = A \sin x + B \cos x$

First derivative:

$$y' = A \cos x - B \sin x$$

Second derivative:

$$y'' = -A \sin x - B \cos x$$

But:

$$A \sin x + B \cos x = y$$

Therefore:

$$y'' = -y$$

Final:

$$\frac{d^2 y}{dx^2} + y = 0$$

Second Derivative in One Frame

FIRST DERIVATIVE:
Differentiate y once



SECOND DERIVATIVE:
Differentiate y' again

$$\frac{d^2y}{dx^2} = \frac{d}{dx} \left(\frac{dy}{dx} \right)$$

Never interpret $\frac{d^2y}{dx^2}$ as $\left(\frac{dy}{dx} \right)^2$.



You've Learned the Theory.

Now Let's Test It.

Reading notes gets you knowledge.

Practicing MCQs gets you marks.

That's exactly what TopAll Pro is built for.

Try TopAll Pro Now

What TopAll Pro Does Differently

-  **Stuck? Snap it. Solve it. — Doubts AI**
Photo → step-by-step solution in seconds, 24/7
-  **Your AI Coach finds your blind spots**
Concept-level weakness detection — not just chapter-level
-  **4.5 Lakh+ questions. Never run out.**
13× more content than any other prep app in India
-  **Build your own test in 60 seconds**
Pick a chapter, set difficulty — AI does the rest instantly.
-  **AI Recommendation that helps you improve**
AI Recommendation Analysis your Tests and tell you where you need to improve.



Practice the moment you finish studying
Jump in while the concept is still fresh in your head

4.5L+
MCQs

1.5L+
Students

AI Powered
In-Depth Analysis