Applications of Derivatives Class 12 Formula Sheet

CBSE Class 12 Maths · NCERT · for boards, NEET and JEE revision

ChapterNotes

Rate of Change

dy/dx represents rate of change of y with respect to x.
If s = f(t) is displacement, then ds/dt = velocity, d^2s/dt^2 = acceleration

Tangent and Normal

Slope of tangent at (x_1,y_1): m = dy/dx at (x_1,y_1)
Equation of tangent: $y - y_1 = m(x - x_1)$
Slope of normal = $-1/m$
Equation of normal: $y - y_1 = (-1/m)(x - x_1)$

Increasing and Decreasing Functions

f'(x) > 0 on (a,b) → f is **strictly increasing** on (a,b)
f'(x) < 0 on (a,b) → f is **strictly decreasing** on (a,b)
f'(x) = 0 at a point → possible turning point (check sign change)

Maxima and Minima

First Derivative Test:
If f'(x) changes from + to − at x = c → local maximum
If f'(x) changes from − to + at x = c → local minimum
If no sign change → neither (inflection point)
Second Derivative Test:
At critical point (f'(c) = 0):
f''(c) < 0 → local maximum
f''(c) > 0 → local minimum
f''(c) = 0 → test fails (use first derivative test)

Approximations

$f(x + \Delta x) \approx f(x) + f'(x)\cdot\Delta x$

Quick revision

- Tangent slope = dy/dx; Normal slope = –dx/dy
- f'(x) > 0 → increasing; f'(x) < 0 → decreasing
- Critical points: where f'(x) = 0 or doesn't exist
- 1st derivative test: check sign change of f'(x)
- 2nd derivative test: f''(c) < 0 → max; f''(c) > 0 → min
- Absolute extrema on closed interval: check critical points + endpoints

Full chapter notes with solved examples and practice questions: https://chapternotes.in/cbse/class-12-maths/applications-of-derivatives-class-12-notes/