

Chapter → 8

→ A. Derivative

→ B. Integration

⇒ A. Derivative :->

किसी सी चीज को छोड़े-2 part में बाटना

$$f(x) = x^2 + 8x + 7$$

$$y = x^2 + 8x + 7$$

$$f(x) \longrightarrow f'(x)$$

$$y \longrightarrow \frac{dy}{dx}$$

$x, y$	→	variable
all other	→	constant

Formulas :->

①

$$\text{Standard function}$$

$$x^n$$

$$f'(x)$$

$$n \cdot x^{n-1}$$

②

$$a^x$$

$$a^x \log_e a$$

③

$$x^2$$

$$2x$$

④

$$x$$

$$1$$

⑤

$$e^x \quad (e = \text{constant})$$

$$e^x$$

⑥

$$\log x$$

$$\frac{1}{x}$$

(7)

$$\frac{1}{x}$$

$$-\frac{1}{x^2}$$

(8)

$$\sqrt{x}$$

$$\frac{1}{2\sqrt{x}}$$

(9)

K (K=constant)

$$0$$

Derivative

Types

• Addition & Subtraction

• ~~Other~~ Multiplication

• Division

• ~~Other~~ variable

• ~~Other~~ Constant

#

Types of Derivative :->

① Type 1 :->

• y -> left side

x -> right side

• ~~Other~~

(i) Addition & Subtraction :->

$$y = u \pm v$$

$$\frac{dy}{dx} = \frac{du}{dx} \pm \frac{dv}{dx}$$

x & y = variable  
Other = Constant

(ii) Multiplication  $\Rightarrow$ 

$$y = u \cdot v$$

$$\frac{dy}{dx} = \frac{du}{dx} \cdot v + u \cdot \frac{dv}{dx}$$

(iii) Division  $\Rightarrow$ 

$$y = \frac{u}{v}$$

$$\frac{dy}{dx} = \frac{\left(\frac{du}{dx}\right)v - (u)\left(\frac{dv}{dx}\right)}{v^2}$$

(2) Type 2  $\Rightarrow$ 

- $x$  &  $y$  दोनों mix होते हैं।
- \* Step 1  $\rightarrow$  Take derivative on both side
- \* Step 2  $\rightarrow$   $\frac{dy}{dx}$  को left में और दोनों को right में

(3) Type 3  $\Rightarrow$ 

- variable will be in Base & in index also

(4) Type 4  $\Rightarrow$ 

- $x$  is given separately &  $y$  is give separately as function of  $t$   
 $x \& t$  and  $y \& t \rightarrow$  variable  
 other and other  $\rightarrow$  constant

$$\frac{dy}{dx} = \frac{\frac{dy}{dt}}{\frac{dx}{dt}}$$

$$y = x^2 + x$$

y as function of x

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Name of function y

So, derivative of  $y = \frac{dy}{dx}$

double derivative of y with respect to x =  $\frac{d^2y}{dx^2}$

$$\left. \begin{aligned} f(x) &= f'(x) = f''(x) \\ y &= \frac{dy}{dx} = \frac{d^2y}{dx^2} \end{aligned} \right\}$$

Gradient = Slope = Derivative.

$x$  &  $y$  = variable  
 other = constant

⇒ B. **Integration** → (S)

• एक करना → बहुत सी चीजों को एक करना

Standard function

Integration

$f(x)$

$\int f(x) \cdot dx$

①  $x^{n+1}$  →  $\frac{x^{n+1}}{n+1}$

②  $a^x$  →  $\frac{a^x}{\log_e a}$

③  $e^x$  →  $e^x$

④  $\frac{1}{x}$  →  $\log_e x$

⑤  $\frac{-1}{x^2}$  →  $\frac{1}{x}$

⑥  $1$  →  $x$

⑦  $K$  ( $K$  = constant) →  $Kx$

⑧  $x$  →  $\frac{x^2}{2}$

Stand formulas ?

f(x)

f(ax+b)

$$\textcircled{1} \quad x^n = \frac{x^{n+1}}{n+1}$$

$$(ax+b)^n = \frac{(ax+b)^{n+1}}{(n+1) \cdot a}$$

$$\textcircled{2} \quad a^x = \frac{a^x}{\log_e a}$$

$$a^{(ax+b)} = \frac{a^{(ax+b)}}{\log_e a \cdot a}$$

$$\textcircled{3} \quad e^x = \frac{e^x}{1+x}$$

$$e^{(ax+b)} = \frac{e^{(ax+b)}}{a}$$

$$\textcircled{4} \quad \frac{1}{x} = \log x$$

$$\frac{1}{ax+b} = \frac{\log(ax+b)}{a}$$

$$\textcircled{5} \quad \frac{-1}{x^2} = \frac{1}{x}$$

$$\frac{-1}{(ax+b)^2} = \frac{1}{(ax+b) \cdot a}$$

$$\textcircled{6} \quad 1 = x$$

$$\textcircled{7} \quad k = kx$$