

Source: [KBhMATH401SubIndex](#)

1 | Derivatives

=> Instantaneous rate of change at a particular point

- Average rate of change = $\frac{\Delta Y}{\Delta X}$

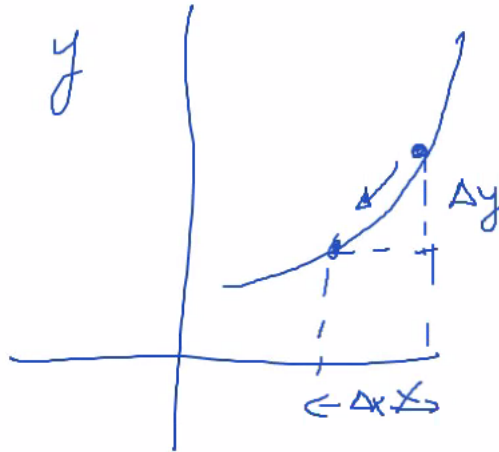


Figure 1: rateofchange.png

- Instantaneous rate of change = $\lim_{\Delta x \rightarrow 0} \frac{\Delta Y}{\Delta X}$

Derivative of $f(x)$ => $\frac{dy}{dx}$

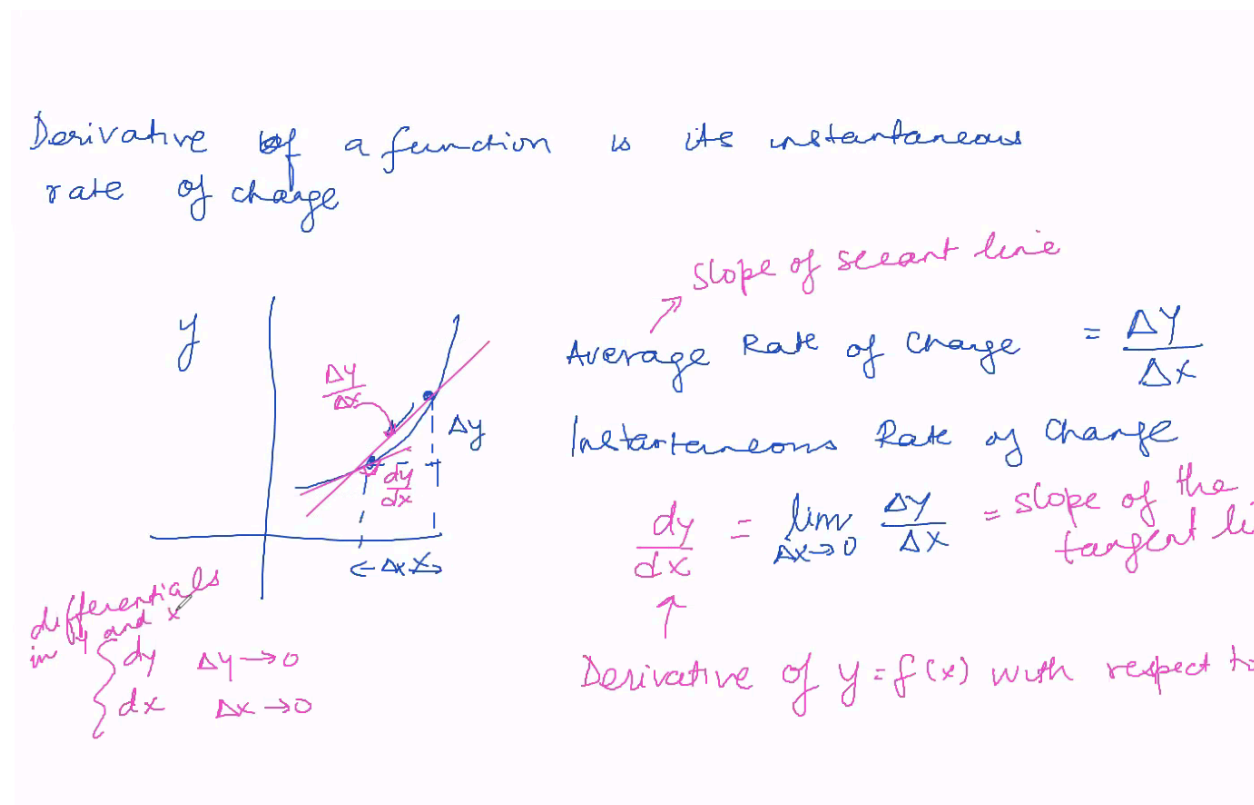


Figure 2: derivativesWB.png

1.1 | Useful Table of Derivatives

| $f(x)$ | $f'(x)$ |
|---------------|-----------------------|
| x^2 | $2x$ |
| x^3 | $3x^2$ |
| x^n | nx^{n-1} |
| $\frac{1}{x}$ | $-\frac{1}{x^2}$ |
| \sqrt{x} | $\frac{1}{2\sqrt{x}}$ |
| $\sin(x)$ | $\cos(x)$ |
| $\cos(x)$ | $-\sin(x)$ |
| $\tan(x)$ | $1 + \tan^2(x)$ |
| $\cot(x)$ | $-\csc^2(x)$ |
| $\sec(x)$ | $\tan(x) \sec(x)$ |
| $\csc(x)$ | $-\cot(x) \csc(x)$ |
| e^x | e^x |
| $\ln(x)$ | $\frac{1}{x}$ |
| a^x | $a^x \ln(a)$ |
| $\log_a(x)$ | $\frac{1}{x \ln(a)}$ |