

Source: [KBhMATH401SubIndex](#)

1 | Derivatives

=> Instantaneous rate of change at a particular point

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

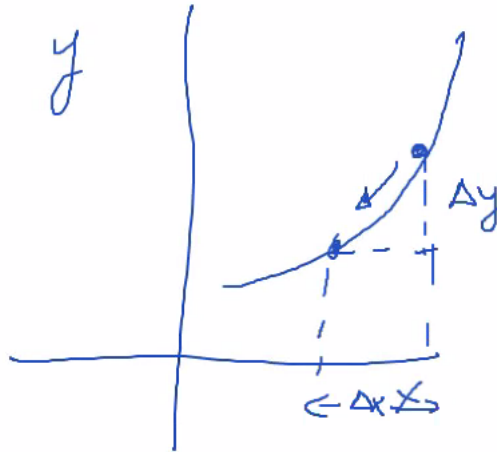
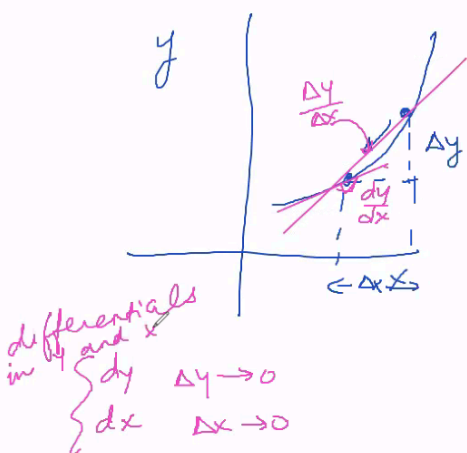


Figure 1: rateofchange.png

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

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

Derivative of a function is its instantaneous rate of change



Average Rate of Change = $\frac{\Delta y}{\Delta x}$

Instantaneous Rate of Change

$$\frac{dy}{dx} = \lim_{\Delta x \rightarrow 0} \frac{\Delta y}{\Delta x} = \text{slope of the tangent line}$$

Derivative of $y=f(x)$ with respect to

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	$a^x \ln(a)$
$\log_a(x)$	$\frac{1}{x \ln(a)}$