1 | **Derivatives**

=> Instantaneous rate of change at a particular point

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

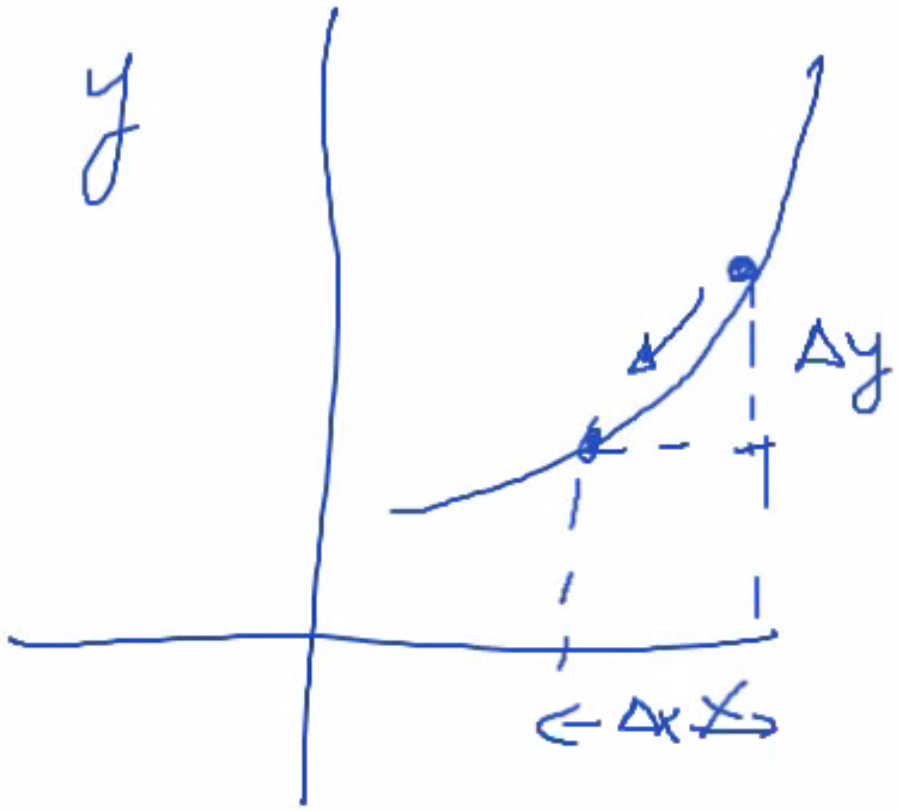

Figure 1: rateofchange.png

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

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

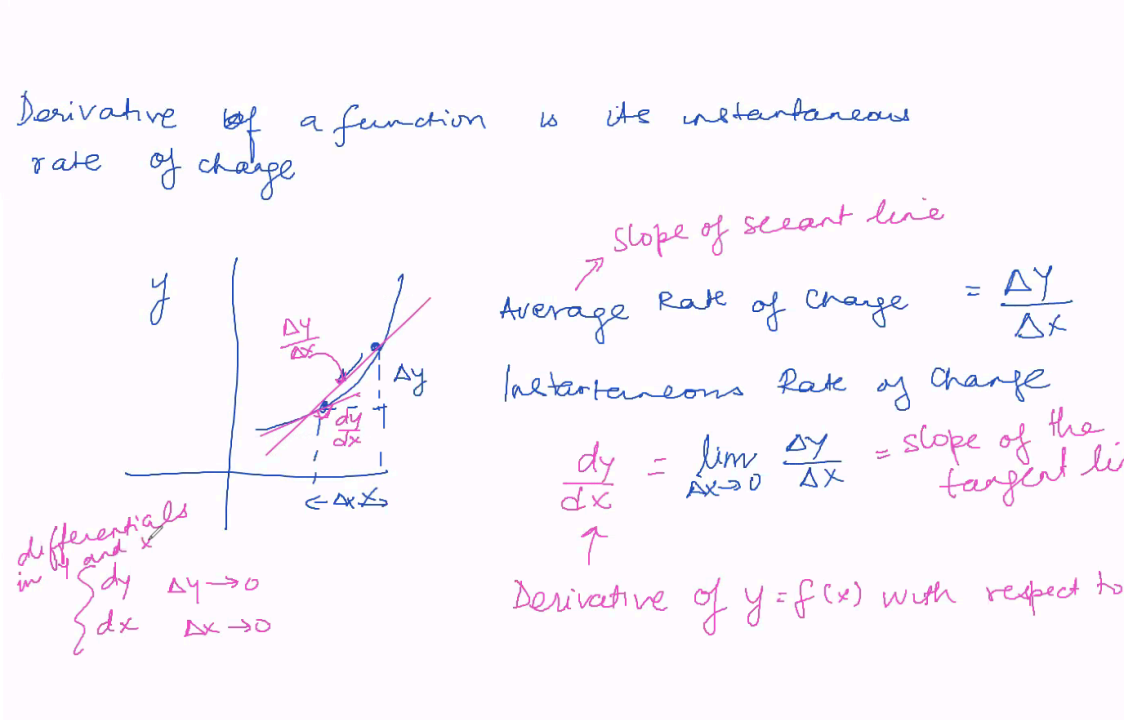

Figure 2: derivativesWB.png

1.1 | **Useful Table of Derivatives**

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