Ch- Differentiation

☆ $y = f(x)$	$\frac{dy}{dx} = f'(x)$
$\sin x$	$\cos x$
$\cos x$	$-\sin x$
$\tan x$	$\sec^2 x$
$\cot x$	$-\operatorname{cosec}^2 x$
$\sec x$	$\sec x \tan x$
$\operatorname{cosec} x$	$-\operatorname{cosec} x \cot x$
x^n	$n x^{n-1}$
$\sqrt{x}$	$1/2\sqrt{x}$
$1/x$	$-1/x^2$
$1/x^n$	$-n/x^{n+1}$
Constant	0
a^x	$a^x \log a$
e^x	e^x
$\log x$	$1/x$

☆ Properties of Logarithm

① $\log_a x = m$ can be written as $x = a^m$

② $\log (a \cdot b \cdot c) = \log a + \log b + \log c$

③ $\log \left(\frac{a}{b}\right) = \log a - \log b$

④ ~~$\log_a b$~~ $= \log a^b = b \log a$

(5) $\log_b a = \frac{\log a}{\log b}$

(6) ~~$a \log_a x = x$~~

(6) $a^{\log_a x} = 1$

(7) $\log_a 1 = 0$; $\log e = 1$

(8) $\log_a 0 = \infty$

(9) $\log_a a = 1$

☆ Derivatives of inverse function:-

If $y = f(x)$ is a differentiable function of 'x' such that $\frac{dy}{dx} \neq 0$ and $x = f^{-1}(y)$ exist

then $x = f^{-1}(y)$ is a differentiable function of 'y' and it is given by $\frac{dx}{dy} = \frac{1}{dy/dx}$

☆ Derivatives of Implicit function.

i) An Implicit function is a function which is written in terms of both dependent (y) and independent (x).

e.g:- $e^{x+y} = e^x + e^y$

☆ Explicit function.

i) An explicit function is a function in which independent variable (y) can be explicitly written in terms of independent variable (x).

e.g:- if $y = x^2 + 4x + 2$

☆ Derivatives of Inverse trigonometric function :-

	$y = f(x)$	$\frac{dy}{dx} = f'(x)$
(1)	$\sin^{-1} x$	$\frac{1}{\sqrt{1-x^2}}$
(2)	$\cos^{-1} x$	$\frac{-1}{\sqrt{1-x^2}}$
(3)	$\tan^{-1} x$	$\frac{1}{1+x^2}$
(4)	$\cot^{-1} x$	$\frac{-1}{1+x^2}$
(5)	$\sec^{-1} x$	$\frac{1}{x\sqrt{x^2-1}}$
(6)	$\operatorname{cosec}^{-1} x$	$\frac{-1}{x\sqrt{x^2-1}}$