SOME CALCULUS FUNCTIONS
DERIVATIVES OF UNIVERSE TRIGONOMETRIC FUNTIONS

- $y = arcsinx(x \in (-1;1)) \rightarrow y' = \dfrac{1}{\sqrt{1-x^2}}$
- $y = arccosx(x \in (-1;1)) \rightarrow y' = \dfrac{-1}{\sqrt{1-x^2}}$
- $y = arctanx \rightarrow y' = \dfrac{1}{1+x^2}$
- y = arccotx $\rightarrow y' = \dfrac{-1}{1+x^2}$

DERIVATIVE OF HYPERBOLIC FUNCTION

- $y = sinhx \rightarrow y' = coshx$
- $y = coshx \rightarrow y' = sinhx$
- $y = tanhx \rightarrow y' = \dfrac{1}{cosh^2 x}$
- $y = cothx \rightarrow y' = \dfrac{-1}{sinh^2 x}$

LEINIZ FORMULA
"If f(x) and g(x) have n^{th} derivative then $f(x) \times g(x)$ also have n^{th} derivative"

$$(f(x) \times g(x))^n = \sum_{k=0}^{n} (C_n^k f^{n-k}(x) g^k(x))$$

SOME BASIC FORMULA

- $(a^x)^n = a^x ln^n a$
- $(e^x)^n = e^x$
- $(sinax)^n = a^n sin(ax + \dfrac{n\pi}{2})$
- $(cosax)^n = a^n cos(ax + \dfrac{n\pi}{2})$
- $((ax+b)^\alpha)^n = a^n \alpha(\alpha-1)\dots(\alpha-n+1)(ax+b)^{\alpha-n}$
- $log_a|x|^n = \dfrac{(-1)^{n-1}(n-1)!}{x^n lna}$
- $ln|x|^n = \dfrac{(-1)^{n-1}(n-1)!}{x^n}$

LINEAR APPROXIMATION
$f(x) \approx f(a) + f'(a)(x-a)$ is called the linear approximation or tangent line approximation of f at a
THE 1ST ORDER DIFFERENTIAL

"The 1st order differential dy of y = f(x) at a is defined in term of dx by equation"

$$df(a) = f'(a)dx$$

THE 2ND ORDER DIFFERENTIAL

"The 2nd order differential of y = f(x) at a is defined in term of dx by equation"

$$d^2 f(a) = f''(a)dx^2$$

THE NTH ORDER DIFFERENTIAL

"The nth order differential of y = f(x) at a is defined in term of dx by equation"

$$d^n f(a) = f^{(n)}(a)dx^n$$