Derivatives

If y = f(x), then the derivative is defined as

$$f'(x) = \lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$$

Basic Properties & Formulas

f(x) and g(x) are differentiable functions (there derivative exists), c and n are any real numbers, f', g' are derivatives of f and g with respect to x. Equivalent notations for derivative $f'(x) = y' = \frac{df}{dx} = \frac{dy}{dx} = \frac{d}{dx}(f(x)) = Df(x)$

1. $\left(cf(x)\right)' = cf'(x)$ 2. $(f(x) \pm g(x))' = f'(x) \pm g'(x)$ 3. $\frac{\mathrm{d}}{\mathrm{d}r}(fg) = fg' + gf'$ \Rightarrow Product Rule 4. $\frac{\mathrm{d}}{\mathrm{d}x}\left(\frac{f}{g}\right) = \frac{gf' - fg'}{g^2}$ \Rightarrow Quotient Rule 5. $\frac{d}{dx}(f(g(x))) = f'(g(x))g'(x)$, In Leibniz notation $\frac{d}{dx}(y) = \frac{d}{du}(y) \times \frac{d}{dx}(u) \Rightarrow$ Chain Rule 6. $\frac{\mathrm{d}}{\mathrm{d}x}(x^n) = nx^{n-1}$ 7. $\frac{\mathrm{d}}{\mathrm{d}r}(c) = 0$ 8. $\frac{\mathrm{d}}{\mathrm{d}x}(x) = 1$ 9. $\frac{d}{dx}(\sin x) = \cos x$ 10. $\frac{\mathrm{d}}{\mathrm{d}x}(\cos x) = -\sin x$ 11. $\frac{\mathrm{d}}{\mathrm{d}x}(\tan x) = \sec^2 x$ 12. $\frac{d}{dx}(\sec x) = \sec x \tan x$ 13. $\frac{d}{dx}(\csc x) = -\csc x \cot x$ 14. $\frac{\mathrm{d}}{\mathrm{d}x}(\cot x) = -\csc^2 x$ 15. $\frac{d}{dx}(\sin^{-1}x) = \frac{1}{\sqrt{1-x^2}}$

Visit http://wp.me/pw13P-a to download the updated version and many more mathematics formulas, please send in your suggestions at thinkprime@gmail.com

16.
$$\frac{d}{dx} (\cos^{-1} x) = \frac{-1}{\sqrt{1 - x^2}}$$

17.
$$\frac{d}{dx} (\tan^{-1} x) = \frac{1}{1 + x^2}$$

18.
$$\frac{d}{dx} (\csc^{-1} x) = \frac{-1}{x\sqrt{x^2 - 1}}$$

19.
$$\frac{d}{dx} (\sec^{-1} x) = \frac{-1}{x\sqrt{x^2 - 1}}$$

20.
$$\frac{d}{dx} (\cot^{-1} x) = \frac{-1}{1 + x^2}$$

21.
$$\frac{d}{dx} (e^x) = e^x$$

22.
$$\frac{d}{dx} (\log x) = \frac{1}{x}$$

23.
$$\frac{d}{dx} (a^x) = a^x \log a$$

Visit http://wp.me/pw13P-a to download the updated version and many more mathematics formulas, please send in your suggestions at thinkprime@gmail.com