Conti. & Diff.

Standard Diff. → / Derivative :-

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

2) $\frac{d}{dx}(c) = 0$

3) $\frac{d}{dx}(x^n) = nx^{n-1}$

4) $\frac{d}{dx}(cx) = c$

5) $\frac{d}{dx}(\sin x) = \cos x$

6) $\frac{d}{dx}(\cos x) = -\sin x$

7) $\frac{d}{dx}(\tan x) = \sec^2 x$

8) $\frac{d}{dx}(\cot x) = -\operatorname{cosec}^2 x$

9) $\frac{d}{dx}(\sec x) = \sec x \cdot \tan x$

10) $\frac{d}{dx}(\operatorname{cosec} x) = -\operatorname{cosec} x \cdot \cot x$

11) $\frac{d}{dx}(\log_e x) = \frac{1}{x}$

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

13) $\frac{d}{dx}(a^x) = a^x \cdot \log_e a$

14) $\frac{d}{dx}(\log_a x) = \frac{1}{x} \times \frac{1}{\log a}$

15) $\frac{d}{dx}(\sin^{-1} x) = \frac{1}{\sqrt{1-x^2}}$

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

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

20) $\frac{d}{dx}(\operatorname{cosec}^{-1} x) = \frac{-1}{x\sqrt{x^2-1}}$

Conti. & Diff.

1) $\log_e M + \log_e N = \log_e (M \cdot N)$

2) $\log_e M - \log_e N = \log_e \left(\frac{M}{N}\right)$

3) $\log_e M^N = N \cdot \log_e M$

4) $\log_b a = \frac{\log_e a}{\log_e b} = \left[\log_e a \times \log_b e\right]$

5) $\log_e e = \log_2 2 = \log_a a = 1$

4) $\frac{d}{dx}(\sqrt{x}) = \frac{1}{2\sqrt{x}}$

5) $\frac{d}{dx}\left(\frac{1}{x}\right) = \frac{-1}{x^2}$

1) $\frac{d}{dx}(u \cdot v) = \frac{du}{dx} v + u \cdot \frac{dv}{dx}$

2) $\frac{d}{dx}(u \cdot v \cdot w) = \frac{du}{dx} v \cdot w + u \cdot \frac{dv}{dx} \cdot w + u \cdot v \cdot \frac{dw}{dx}$

3) $\frac{d}{dx}\left(\frac{u}{v}\right) = \frac{v \cdot \frac{du}{dx} - u \cdot \frac{dv}{dx}}{v^2} = \frac{v \cdot u' - u \cdot v'}{v^2}$

Chain Rule:-

$g(x) = x^2$

$f(g(x)) = \frac{1}{x^2}$

term $\boxed{f(g(x))} \rightarrow \frac{d}{dx}\left[f(g(x))\right]$

$$\boxed{\frac{d}{dx}\left[f(g(x))\right] = f'(g(x)) \times g'(x)}$$

i) $\sin(2x+5)$

ii) $\sin(\cos(x^2))$

iii) $\cos(\sqrt{x})$

iv) $\frac{\sin(ax+b)}{\cos(cx+d)}$