

SUMMARY :

AID TO MEMORY

Differential coefficients of standard functions are given below to remember and to make use of them in the problems.

$$1. \frac{d}{dx} (c) = 0$$

$$3. \frac{d}{dx} [f_1(x) \pm f_2(x)] = \frac{d}{dx} f_1(x) \pm \frac{d}{dx} f_2(x)$$

$$5. \frac{d}{dx} e^x = e^x$$

$$2. \frac{d}{dx} [k \cdot f(x)] = k \cdot \frac{d}{dx} f(x)$$

$$4. \frac{d}{dx} x^n = n x^{n-1}$$

$$6. \frac{d}{dx} a^x = a^x \log_e a$$

$$7. \frac{d}{dx} \log_e x = \frac{1}{x}$$

$$9. \frac{d}{dx} \sin x = \cos x$$

$$11. \frac{d}{dx} \tan x = \sec^2 x$$

$$13. \frac{d}{dx} \sec x = \sec x \tan x$$

$$8. \frac{d}{dx} \log_a x = \frac{1}{x} \log_a e$$

$$10. \frac{d}{dx} \cos x = -\sin x$$

$$12. \frac{d}{dx} \cot x = -\operatorname{cosec}^2 x$$

$$14. \frac{d}{dx} \operatorname{cosec} x = -\operatorname{cosec} x \cot x$$

AID TO MEMORY

$$1. \frac{d}{dx} [f_1(x) \times f_2(x)] = f_1(x) \times f_2'(x) + f_2(x) \times f_1'(x)$$

(Product Rule)

$$2. \frac{d}{dx} \frac{f_1(x)}{f_2(x)} = \frac{f_2(x) \times f_1'(x) - f_1(x) \times f_2'(x)}{[f_2(x)]^2}$$

(Quotient Rule)

AID TO MEMORY

Laws of logarithms :

1. $\log_a (m \times n) = \log_a m + \log_a n$

2. $\log_a \left(\frac{m}{n} \right) = \log_a m - \log_a n$

3. $\log_a m^n = n \log_a m$

4. $\log_a m = \frac{\log m}{\log a}$

5. $\log_a m = \frac{1}{\log_m a}$

6. If the function is of the form $y = x^x$ or $y = (\sin x)^{\cos x}$, then take log of both sides and then differentiate.

AID TO MEMORY

Differential Coefficient of Inverse functions :

Remember the differentials of the inverse functions given below to use directly in the problems.

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

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

$$3. \quad \frac{d}{dx} (\tan^{-1} x) = \frac{1}{1+x^2}$$

$$4. \quad \frac{d}{dx} \cot^{-1} x = \frac{-1}{1+x^2}$$

$$5. \quad \frac{d}{dx} \sec^{-1} x = \frac{1}{x\sqrt{x^2-1}}$$

$$6. \quad \frac{d}{dx} \operatorname{cosec}^{-1} x = \frac{-1}{x\sqrt{x^2-1}}$$

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

$$2. \frac{d}{dx} \cosh x = \sinh x$$

$$3. \frac{d}{dx} (\tanh x) = \operatorname{sech}^2 x$$

$$4. \frac{d}{dx} \coth x = -\operatorname{cosech}^2 x$$

$$5. \frac{d}{dx} (\operatorname{sech} x) = -\operatorname{sech} x \tanh x$$

$$6. \frac{d}{dx} \operatorname{cosech} x = -\operatorname{cosech} x \coth x$$