F.Sc.(Part-2)
Differentiation
CH # 2

IMPORTANT—FORMULAS

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1. $\frac{d}{dx}(c) = 0,$ *'c' is any constant.*	**2.** $\frac{d}{dx}(x) = 1$
3. $\frac{d}{dx}(x^n) = n\,x^{n-1}$ *(The Power Rule)*	**4.** $\frac{d}{dx}(\ln x) = \frac{1}{x}$
5. $\frac{d}{dx}(e^x) = e^x$	**6.** $\frac{d}{dx}\left(e^{f(x)}\right) = e^{f(x)}\,.f'(x)$
7. $\frac{d}{dx}\log_a x = \frac{1}{x\,\ln a}$	**8.** $\frac{d}{dx}(a^x) = a^x \ln a$
9. $\frac{d}{dx}(\sin x) = \cos x$	**10.** $\frac{d}{dx}(\cos x) = -\sin x$
11. $\frac{d}{dx}(\tan x) = sec^2 x$	**12.** $\frac{d}{dx}(\cot x) = -cosec^2 x$
13. $\frac{d}{dx}(\sec x) = \sec x \tan x$	**14.** $\frac{d}{dx}(cosec\ x) = -\operatorname{cosec} x \cot x$
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.** $\frac{d}{dx}(\operatorname{cosec}^{-1} x) = \frac{-1}{x\sqrt{x^2-1}}$
21. $\frac{d}{dx}(\sin hx) = \cosh x$	**22.** $\frac{d}{dx}(\cosh x) = \sinh x$
23. $\frac{d}{dx}(\tanh x) = sech^2 x$	**24.** $\frac{d}{dx}(\coth x) = -cosech^2 x$
25. $\frac{d}{dx}(\operatorname{sech} x) = -\operatorname{sec} hx \tanh x$	**26.** $\frac{d}{dx}(cosech\ x) = -\ cosechx\ coth\, x$
27. $\frac{d}{dx}(\sinh^{-1} x) = \frac{1}{\sqrt{1+x^2}}$	**28.** $\frac{d}{dx}(\cosh^{-1} x) = \frac{1}{\sqrt{x^2-1}}$
29. $\frac{d}{dx}(\tanh^{-1} x) = \frac{1}{1-x^2}$	**30.** $\frac{d}{dx}(\coth^{-1} x) = \frac{1}{1-x^2}$
31. $\frac{d}{dx}(\operatorname{sech}^{-1} x) = \frac{-1}{x\sqrt{1-x^2}}$	**32.** $\frac{d}{dx}(\operatorname{cosech}^{-1} x) = \frac{-1}{x\sqrt{1+x^2}}$
33. $\frac{d}{dx}[f(x)g(x)] = \left[\frac{d}{dx}f(x)\right]g(x) + f(x)\left[\frac{d}{dx}g(x)\right]$ *(The Product Rule)*	
34. $\frac{d}{dx}\left[\frac{f(x)}{g(x)}\right] = \frac{g(x)\left[\frac{d}{dx}f(x)\right] - f(x)\left[\frac{d}{dx}g(x)\right]}{[\,g(x)\,]^2}$ *(The Quotient Rule)*	
35. $(fog)'(x) = f'[g(x)].g'(x)$ *or* $\frac{dy}{dx} = \frac{dy}{du}.\frac{du}{dx}$ *(The Chain Rule)*	