

# F.Sc Math Part 2

## Solved Notes

### Important Formulas Derivatives

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$$1. \frac{d}{dx}(c) = 0, \quad 'c' \text{ is any constant.}$$

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

$$3. \frac{d}{dx}(x^n) = n x^{n-1} \text{ (The Power Rule)}$$

$$4. \frac{d}{dx}(\ln x) = \frac{1}{x} \quad \text{WWW.SEDIINFO.NET}$$

$$5. \frac{d}{dx}(e^x) = e^x \quad \text{WWW.SEDIINFO.NET}$$

$$6. \frac{d}{dx}(e^{f(x)}) = e^{f(x)} \cdot f'(x)$$

$$7. \frac{d}{dx} \log_a x = \frac{1}{x \ln a}$$

$$8. \frac{d}{dx}(a^x) = a^x \ln a$$

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

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

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

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

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

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

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

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

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

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

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

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

$$21. \frac{d}{dx}(\sin hx) = \cosh x$$

$$22. \frac{d}{dx}(\cosh x) = \sinh x$$

$$23. \frac{d}{dx}(\tanh x) = \operatorname{sech}^2 x$$

$$24. \frac{d}{dx}(\coth x) = -\operatorname{cosech}^2 x$$

$$25. \frac{d}{dx}(\operatorname{sech} x) = -\operatorname{sech} x \tanh x$$

$$26. \frac{d}{dx}(\operatorname{cosech} x) = -\operatorname{cosech} x \coth x$$

$$27. \frac{d}{dx}(\sinh^{-1} x) = \frac{1}{\sqrt{1+x^2}}$$

$$28. \frac{d}{dx}(\cosh^{-1} x) = \frac{1}{\sqrt{x^2-1}}$$

$$29. \frac{d}{dx}(\tanh^{-1} x) = \frac{1}{1-x^2}$$

$$30. \frac{d}{dx}(\coth^{-1} x) = \frac{1}{1-x^2}$$

$$31. \frac{d}{dx}(\operatorname{sech}^{-1} x) = \frac{-1}{x\sqrt{1-x^2}}$$

$$32. \frac{d}{dx}(\operatorname{cosech}^{-1} x) = \frac{-1}{x\sqrt{1+x^2}}$$

$$33. \frac{d}{dx}[f(x)g(x)] = \left[\frac{d}{dx}f(x)\right]g(x) + f(x)\left[\frac{d}{dx}g(x)\right] \quad \text{(The Product Rule)}$$

$$34. \frac{d}{dx}\left[\frac{f(x)}{g(x)}\right] = \frac{g(x)\left[\frac{d}{dx}f(x)\right] - f(x)\left[\frac{d}{dx}g(x)\right]}{[g(x)]^2} \quad \text{(The Quotient Rule)}$$

$$35. (f \circ g)'(x) = f'[g(x)] \cdot g'(x) \quad \text{or} \quad \frac{dy}{dx} = \frac{dy}{du} \cdot \frac{du}{dx} \quad \text{(The Chain Rule)}$$