

SELF ASSESSMENT TEST -2

CLASS 10+2

Logarithmic differentiation

1. Diff. (a) x^x (b) $\sin x^{\log x}$ (c) $x^{\sin^{-1}x}$ w.r.t.x

2. Diff. (a) $(x^x)^x$ (b) $(x^x)^{\sqrt{x}}$ w.r.t.x

3. Diff. $(\cos x)^x + x^{\cos x}$ w.r.t.x

4. Diff. $(\tan x)^x + (\sin x)^{\frac{1}{x}}$ w.r.t.x

5. Diff. $(\log x)^x + x^{\log x}$ w.r.t.x

6. Diff. $\left(x + \frac{1}{x}\right)^x + x^{x+\frac{1}{x}}$ w.r.t.x

7. If $y = x^y$, prove that $\frac{dy}{dx} = \frac{y^2}{x(1-y \log x)}$

8. If $x^y = e^{x-y}$, prove that $\frac{dy}{dx} = \frac{\log x}{(1+\log x)^2}$

9. If $x^y = y^x$, prove that $\frac{dy}{dx} = \frac{\frac{y}{x} - \log y}{\frac{x}{y} - \log x}$

10. If $x^y + y^x = 5$ find $\frac{dy}{dx}$

11. If $x^5 y^4 = (x+y)^9$ prove that $\frac{dy}{dx} = \frac{y}{x}$

12. Diff. $(x+2)^2(x+3)^4(x+7)^5$ w.r.t.x

13. Diff. (a) x^{x^x} (b) $x^{\sqrt{x}}$ w.r.t.x

14. If $y = (\sin x - \cos x)^{(\sin x - \cos x)}$ find $\frac{dy}{dx}$

15. Find $\frac{dy}{dx}$ when $xy = e^{x-y}$

16. If $(\sin x)^y = (\cos y)^x$ find $\frac{dy}{dx}$

17. If $x^4 y^5 = 1$, prove that $\frac{dy}{dx} = -\frac{4y}{5x}$

18. If $y = \sin(x^x)$, prove that $\frac{dy}{dx} = \cos(x^x) x^x (1 + \log x)$

19. Diff. $\sqrt{\frac{(x-1)(x-2)}{(x-3)(x-4)(x-5)}}$ w.r.t.x

20. If $x = e^{\frac{x}{y}}$ prove that $\frac{dy}{dx} = \frac{x-y}{x \log x}$