

Math 121 MPOD - #22
Exponential and Log Derivatives

Find $\frac{dy}{dx}$ for:

1. $y = x^2 e^{-x}$

2. $y = 5^x$

3. $y = \log_5 x$

4. $y = \ln(1 + e^{2x})$

5. $y = e^{x \sin x}$

6. $y = x^{\sin x}$

7. $y = \ln \left[\frac{1+x}{1-x} \right]$

8. $y = \ln(x^2 + 3x + 2)$

9. $y = (\ln x)^3$

10. $y = x^3 \ln x$

11. $y = \ln(\ln(\ln x))$

12. $y = \sin^2(\ln x)$

13. $y = \ln \left[\frac{(x^2 + 2x + 3)^4 (2x - 3x^3)^7}{(x - 3)^2} \right]$

14. $y = \sqrt[5]{\frac{x-1}{x+1}}$

Answers

1. $\frac{dy}{dx} = -x^2 e^{-x} + 2x e^{-x}$

2. $\frac{dy}{dx} = 5^x (\ln 5)$

3. $\frac{dy}{dx} = \frac{1}{x \ln 5}$

4. $\frac{dy}{dx} = \frac{2 e^{2x}}{1 + e^{2x}}$

5. $\frac{dy}{dx} = [x \cos x + \sin x] e^{x \sin x}$

6. $\frac{dy}{dx} = x^{\sin x} \left[\frac{\sin x}{x} + (\cos x) \ln x \right]$

7. $\frac{dy}{dx} = \frac{2}{1 - x^2}$

8. $\frac{dy}{dx} = \frac{2x + 3}{x^2 + 3x + 2}$

9. $\frac{dy}{dx} = \frac{3(\ln x)^2}{x}$

10. $\frac{dy}{dx} = x^2 + 3x^2 \ln x$

11. $\frac{dy}{dx} = \frac{1}{x(\ln x)(\ln(\ln x))}$

12. $\frac{dy}{dx} = \frac{2 \sin(\ln x) \cos(\ln x)}{x}$

13. $\frac{dy}{dx} = \frac{8x + 8}{x^2 + 2x + 3} + 7 \frac{2 - 9x^2}{2x - 3x^3} - \frac{2}{x - 3}$

14. $\frac{dy}{dx} = \frac{1}{5} \sqrt[5]{\frac{x-1}{x+1}} \left[\frac{1}{x-1} - \frac{1}{x+1} \right]$