

Practice Derivative Problems Solutions

1. $f'(x) = 2(x^2 + 1)^{\frac{1}{2}} + (2x + 1)(\frac{1}{2})(x^2 + 1)^{-\frac{1}{2}}(2x)$
2. $f'(x) = \frac{5x^4}{x^5 + 6} e^{\ln(x^5 + 6)} = 5x^4$
3. $f'(x) = x^{-\frac{1}{2}} - \frac{1}{2}x^{-\frac{3}{2}}$
4. $f'(x) = (1 + e^x)e^{x+e^x}$
5. $f'(x) = \frac{3}{4}(3x^5 - 1)^{-\frac{1}{4}}(15x^4)(x^3 + 2)^{\frac{8}{9}} + \frac{8}{9}(x^3 + 2)^{-\frac{1}{9}}(3x^2)(3x^5 - 1)^{\frac{3}{4}}$
6. $f'(x) = 3^{x^2+5x+1}(2x + 5)(\ln 3)$
7. $f'(x) = 5[(x^4 - 7x^2)^6 + 4x^3]^4[6(x^4 - 7x^2)^5(4x^3 - 14x) + 12x^2]$
8. $f'(x) = \frac{1}{x} + \frac{2 \ln x}{x} + \frac{3(\ln x)^2}{x}$
9. $f'(x) = \frac{3}{2}(x^3 + 5x + 9)^{\frac{1}{2}}(3x^2 + 5)$
10. $f'(x) = e^{\ln(1+e^{\ln x})} \left(\frac{\frac{1}{x} e^{\ln x}}{1 + e^{\ln x}} \right) = 1$
11. $f'(x) = \frac{1}{3}(x^3 + x^{-3})^{-\frac{2}{3}}(3x^2 - 3x^{-4})$
12. $f'(x) = \frac{1}{(\log_7(\log_5(x+2)))(\ln 3)} \frac{1}{(\log_5(x+2))(\ln 7)} \frac{1}{(x+2)(\ln 5)}$
13. $f'(x) = 3(\ln x + xe^x + 1)^2 \left(\frac{1}{x} + e^x + xe^x \right)$
14. $f'(x) = \frac{1}{2}(x^4 + 3x)^{-\frac{1}{2}}(4x^3 + 3)e^{\sqrt{x^4+3x}} \ln(x^2 + 2x) + e^{\sqrt{x^4+3x}} \left(\frac{2x + 2}{x^2 + 2x} \right)$
15. $f'(x) = (4x^3 + 6x)e^{x^4+3x^2+1}(4x^3 + 6x)^2 + 2(4x^3 + 6x)(12x^2 + 6)e^{x^4+3x^2+1}$
16. $f'(x) = e^x e^{e^x} + \frac{1}{(\ln(\ln(x)))} \frac{1}{\ln(x)} \frac{1}{x}$
17. $f'(x) = 4 \left[\frac{\ln(x) + 4}{e^x} \right]^3 \frac{e^x \left(\frac{1}{x} \right) - e^x (\ln(x) + 4)}{(e^x)^2}$
18. $f'(x) = 4(x^2 + 6x + 1)^3(2x + 6)$
19. $f'(x) = \frac{4}{3} [\ln(x^2 + 1)]^{\frac{1}{3}} \frac{2x}{x^2 + 1}$
20. $f'(x) = e^x + \frac{1}{x}$
21. $f'(x) = \left(\frac{2}{3}x^{-\frac{1}{3}} - \frac{3}{2}x^{-\frac{1}{2}} - \frac{24}{5}x^{-\frac{9}{5}} \right) e^{x^2+1} + (x^{\frac{2}{3}} - 3x^{\frac{1}{2}} + 6x^{-\frac{4}{5}})(2xe^{x^2+1})$
22. $f'(x) = [(4x^3 + 2x)e^{x^4+x^2} + (4x^3)e^{x^4} + (2x)e^{x^2}](x^4 + x^2) + (e^{x^4+x^2} + e^{x^4} + e^{x^2})(4x^3 + 2x)$
23. $f'(x) = 3 \left(\frac{\ln(x)}{x^2 + 1} \right)^2 \left[\frac{(x^2 + 1)^{\frac{1}{x}} - (\ln(x))(2x)}{(x^2 + 1)^2} + 3x^2 e^{x^3} (3x^4 + 2x + 1)^2 + e^{x^3} (2)(3x^4 + 2x + 1)(12x^3 + 2) \right]$
24. $f'(x) = \frac{3}{8} \left[\left(\frac{7x^4 - x^2}{x^6} \right)^5 + (x^2 - 1)^3 (2x + x^3)^5 \right]^{-\frac{5}{8}} \left[5 \left(\frac{7x^4 - x^2}{x^6} \right)^4 \left[\frac{x^6(28x^3 - 2x) - (7x^4 - x^2)(6x^5)}{(x^6)^2} \right] + 3(x^2 - 1)^2 (2x)(2x + x^3)^5 + (x^2 - 1)^3 (5)(2x + x^3)^4 (2 + 3x^2) \right]$
25. $f'(x) = \frac{1}{2} (e^{x^2} + (e^{x^{\frac{1}{2}} + 1})(\ln(x^4 + 1) + 3)^2)^{-\frac{1}{2}} [2xe^{x^2} + \left(\frac{1}{2}x^{-\frac{1}{2}}(e^{x^{\frac{1}{2}}}) \right) (\ln(x^4 + 1) + 3)^2 + (e^{x^{\frac{1}{2}} + 1})(2)(\ln(x^4 + 1) + 3) \frac{4x^3}{x^4 + 1}]$