Practice Derivative Problems Solutions

1. $f'(x) = 2(x^2+1)^{\frac{1}{2}} + (2x+1)\left(\frac{1}{2}\right)(x^2+1)^{-\frac{1}{2}}(2x)$
2. $f'(x) = \left(\frac{5x^4}{x^5+6}\right)e^{\ln(x^5+6)} = 5x^4$
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. $f'(x) = \frac{1}{\ln(\ln(x+2))}\frac{1}{\ln(x+2)}\frac{1}{(x+2)}$
13. $f'(x) = 3(\ln x + xe^x + 1)^2\left(\frac{1}{x} + e^x + xe^x\right)$
14. $f'(x) = \frac{1}{2}(x^4+3x)^{-\frac{1}{2}}(4x^3+3)e^{\sqrt{x^4+3x}}\ln(x^2+2x) + e^{\sqrt{x^4+3x}}(\frac{2x+2}{x^2+2x})$
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. $f'(x) = 4[\frac{\ln(x)+4}{e^x}]^3\frac{e^x(\frac{1}{x}) - e^x(\ln(x)+4)}{(e^x)^2}$
18. $f'(x) = 4(x^2+6x+1)^3(2x+6)$
19. $f'(x) = \frac{4}{3}[\ln(x^2+1)]^{\frac{1}{3}}\left(\frac{2x}{x^2+1}\right)$
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. $f'(x) = 3\left(\frac{\ln(x)}{x^2+1}\right)^2\left[\frac{(x^2+1)\frac{1}{x} - (\ln(x))(2x)}{(x^2+1)^2}\right] + 3x^2e^{x^3}(3x^4+2x+1)^2 + e^{x^3}(2)(3x^4+2x+1)(12x^3+2)$
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. $f'(x) = \frac{1}{2}\left(e^{x^2} + (e^{x^{\frac{1}{2}}}+1)(\ln(x^4+1)+3)^2\right)^{-\frac{1}{2}}\left[2xe^{x^2} + \left(\frac{1}{2}x^{-\frac{1}{2}}\right)\left(e^{x^{\frac{1}{2}}}\right)\left(\ln(x^4+1)+3\right)^2 + (e^{x^{\frac{1}{2}}}+1)(2)(\ln(x^4+1)+3)\left(\frac{4x^3}{x^4+1}\right)\right]$