Li Chen @ Fall, 2006

Math 131

Supplementary problems #4 --- Derivative Rules (Short Cuts)

1. $f(x)=\dfrac{2}{3\sqrt[5]{x^2}}-2x^{0.7}+2e^{0.2x}-(0.78)^x-\dfrac{1}{x}+e^{\sqrt{2}}$

2. $y=3\cdot 3^x+\ln(4x)$

3. $f(x)=\sqrt[3]{x^2+2e^x-6}$

4. $g(t)=7e^{3t+5}+t^e$

5. $H(t)=\dfrac{t^2+5t+2}{t+3}$

6. $y=\dfrac{5}{2\cdot\sqrt{\ln x+xe^x+1}}$

7. $h(u)=(1.978)^{5u}+5u+5$

8. $y=\ln(1-2x+x^2)$

9. $y=\ln(\ln(6x^2-7))$

10. $f(x)=\sqrt{3x^2-4x+5}\cdot(3e^{2x}+5)^2$

11. $f(u)=\ln\sqrt[3]{\dfrac{e^u}{1+u^2}}$

12. $f(x)=\ln\dfrac{x^5e^{3x}\sqrt{3x+1}}{(1+\ln x)^3}$

13. $y=\ln[(x^2+1)(x^2+2)(x^2+3)]$

14. $f(x)=(1.027)^{1.027x^2+e^x+1}$

15. $f(t)=[(t^4-7t^2)^6+4t^3]^5$

16. $f(x)=(\dfrac{e}{x}+x^{3/2})^{4/5}(45x^2+3x+2)^{6/5}$

17. $y=\dfrac{(.63)^x(e^{-x})}{5x^2+9x+2}$

18. $f(t)=e^{e^t}+\ln(\ln(\ln(t)))$

19. $y=\sqrt[4]{\dfrac{\ln x+4}{e^x}}$

20. $f(x)=2^{x^3+3x^2-1}(\sqrt[3]{x^2}-3\sqrt{x}+\dfrac{6}{\sqrt[5]{x^4}})$

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Answers:

1. $f'(x) = -\frac{4}{15\sqrt[5]{x^7}} - 1.4x^{-0.3} + 0.4e^{0.2x} - (0.78)^x \ln(.78) + \frac{1}{x^2}$
2. $y' = 3 \cdot 3^x \cdot \ln 3 + \frac{1}{x}$
3. $f'(x) = \frac{1}{3}(x^2 + 2e^x - 6)^{-2/3} \cdot (2x + 2e^x)$
4. $g'(t) = 21e^{3t+5} + e \cdot t^{e-1}$
5. $H'(t) = \frac{(t+3)(2t+5) - (t^2+5t+2)}{(t+3)^2} = \frac{t^2+6t+13}{(t+3)^2}$
6. $y = -\frac{5}{4}(\ln x + xe^x + 1)^{-3/2}(\frac{1}{x} + e^x + xe^x)$
7. $h(u) = (1.978)^{5u} \cdot 5 \cdot \ln(1.978) + 5$
8. $y' = \frac{2x-2}{1-2x+x^2}$
9. $y' = \frac{12x}{(6x^2-7) \cdot \ln(6x^2-7)}$
10. $f'(x) = (3x^2-4x+5)^{-1/2}(3x-2)(3e^{2x}+5)^2 + 12e^{2x}(3x^2-4x+5)^{1/2}(3e^{2x}+5)$
11. $f'(u) = \frac{1}{3}(1 - \frac{2u}{1+u^2})$
12. $f'(x) = \frac{5}{x} + 3 + \frac{3}{2(3x+1)} - \frac{3}{x(1+\ln x)}$
13. $y' = 2x \cdot [\frac{1}{x^2+1} + \frac{1}{x^2+2} + \frac{1}{x^2+3}]$
14. $f'(x) = (1.027)^{1.027x^2+e^x+1}(2.054x + e^x) \cdot \ln(1.027)$
15. $f'(t) = 5[(t^4-7t^2)^6 + 4t^3]^4[6(t^4-7t^2)^5(4t^3-14t) + 12t^2]$
16. $f'(x) = \frac{4}{5}(\frac{e}{x} + x^{3/2})^{-1/5}(-\frac{e}{x^2} + \frac{3}{2}x^{1/2}) \cdot (45x^2+3x+2)^{6/5} + (\frac{e}{x} + x^{3/2})^{4/5} \cdot \frac{6}{5}(45x^2+3x+2)^{1/5}(90x+3)$
17. $y' = \frac{(5x^2+9x+2) \cdot ((.63)^x \ln(.63)e^{-x} - (.63)^x e^{-x}) - ((.63)^x e^{-x}) \cdot (10x+9)}{(5x^2+9x+2)^2}$
18. $f'(t) = e^t e^{e^t} + \frac{1}{\ln(\ln(t))} \cdot \frac{1}{\ln t} \cdot \frac{1}{t}$
19. $y = \frac{1}{4}\left[\frac{\ln x + 4}{e^x}\right]^{-3/4} \frac{e^x(1/x) - e^x(\ln x + 4)}{e^{2x}}$
20. $f'(x) = 2^{x^3+3x^2-1}(3x^2+6x) \cdot \ln 2 \cdot (\sqrt[3]{x^2} - 3\sqrt{x} + \frac{6}{\sqrt[5]{x^4}}) + 2^{x^3+3x^2-1}(\frac{2}{3}x^{-1/3} - \frac{3}{2}x^{-1/2} - \frac{24}{5}x^{-9/5})$

If you find any mistakes, please let me know. Thanks! ***li-chen2@neo.tamu.edu***