1. $y' = \dfrac{1}{\ln x} \cdot \dfrac{1}{x} - e\,(\ln x)^{-2} \cdot \dfrac{1}{x} + e \cdot \dfrac{1}{x} + 0 + \dfrac{1}{e} \cdot \dfrac{1}{x} + 0 + (\ln x)e^x + e^x \cdot \dfrac{1}{x}$

2. $f'(x) = \sec^2\big(\ln(1+x^2)\big) \cdot \dfrac{1}{1+x^2} \cdot (2x) + \dfrac{1}{1+\cos^2 x} \cdot 2\cos x\,(-\sin x) - 5\big(\ln(1+x^2)\big)^{-2} \cdot \dfrac{1}{1+x^2}\,(2x)$

3. $y' = \dfrac{4}{7}\left(\dfrac{1}{x^2+1}\right)(2x) + \sec^2 x - \dfrac{1}{2(1+\sqrt{x})} \cdot \dfrac{1}{2\sqrt{x}}$

4. $\dfrac{dy}{dx} = 5^x \cdot (\ln 5)$

5. $\dfrac{dy}{dx} = (\tan x)^x \left(\dfrac{x\sec^2 x}{\tan x} + \ln(\tan x)\right)$

6. $f'(x) = e^{-\sin x} \cdot (-\cos x) - e\big(\sin(e^x)\big)^{-2} \cdot \cos(e^x)e^x$

7. $g'(e^4) = \dfrac{3}{4e^4}$

8. Absolute Max Value $f(-1) = \boxed{e}$

9. $-\dfrac{9}{x} - \ln|x| + C$

10. $\dfrac{8}{3}$

11. $1 - \ln|e-1|$

12. 2

13. $-\dfrac{1}{3}\ln\big|\cos(3x)\big| + C$

14. $-\dfrac{1}{4}\ln\left(\dfrac{7}{3}\right)$ OR $\dfrac{1}{4}\ln\left(\dfrac{3}{7}\right)$

15. $\dfrac{2}{3} + \ln 3$

16. $\dfrac{1}{2}\ln 5$ OR $\ln\sqrt{5}$

17. $\dfrac{e^{-3x}}{-3} + 2x + \dfrac{e^{3x}}{3} + C$

18. $f(x) = -\dfrac{1}{4(1-2e^{-2x})} - \dfrac{5}{4}$

19. $y = 2x + 2$

20. $y = -\dfrac{2}{9}x + \dfrac{2\ln 3}{9} + \dfrac{1}{9}$