1. $y' = -4e^{-2x}\sin(4x) - 2e^{-2x}\cos(4x)$

2. $f'(x) = -\dfrac{e^{\frac{1}{x}}}{x^2}$

3. $y' = \cos(e^x) \cdot e^x + e^{\sin x} \cdot \cos x$

4. $y' = -4\sin(e^{4x}) \cdot e^{4x} - 4e^{\cos(4x)} \cdot \sin(4x)$

Product Rule

5. $f'(x) = e^{x^2 \cdot \tan(2x)} \left(x^2 \cdot \sec^2(2x) \cdot 2 + \tan(2x) \cdot (2x) \right)$

6. $y' = e^{-\frac{1}{x}} (1 + 2x)$

7. $y' = \dfrac{3e^{3x}}{\sqrt{1 + 2e^{3x}}}$

8. $y' = e^{(e^x)} \cdot e^x$

9. $f'(x) = \dfrac{4}{(e^x + e^{-x})^2}$

10. $y = \dfrac{e^2}{4} x$

12. $\dfrac{x^{e+1}}{e+1} + e^x + C$

13. $\dfrac{1}{7} e^{x^7} + C$

14. $\dfrac{(4+e^x)^6}{6} + C$

15. $\dfrac{e^{6x}}{6} - \dfrac{1}{6e^{6x}} + C$

16. $2\sqrt{1 + e^x} + C$

17. $e^{\tan x} + C$

18. $\dfrac{e^{2x}}{2} + 2x - \dfrac{1}{2e^{2x}} + C$

19. $-\dfrac{2}{9}\left(1 + e^{-3x}\right)^{\frac{3}{2}} + C$

20. $-e^{1/x} + C$

21. $\dfrac{-1}{e^x} + 2x + e^x + C$

11. Absolute Max Occurs AT $x = 0$ and Max Value is $f(0) = 0 - e^0 = -1$