Differentiation - Chain Rule - Exponential & Logarithmic Forms

Find $f'(x)$.

1. $f(x) = e^{4x+1} \longrightarrow f'(x) = 4\,e^{4x+1}$

2. $f(x) = e^{2x-3} \longrightarrow f'(x) = 2\,e^{2x-3}$

3. $f(x) = e^{\sin x} \longrightarrow f'(x) = \cos x\, e^{\sin x}$

4. $f(x) = e^{\tan x} \longrightarrow \sec^2 x\, e^{\tan x}$

5. $f(x) = e^{\sec^{-1} x} \longrightarrow f'(x) = \dfrac{1}{x\sqrt{x^2-1}} e^{\sec^{-1} x} = \dfrac{e^{\sec^{-1} x}}{x\sqrt{x^2-1}}$

6. $f(x) = \ln(2x+1) \longrightarrow f'(x) = \dfrac{\frac{d}{dx}\left[2x+1\right]}{2x+1} = \dfrac{2}{2x+1}$

7. $f(x) = \ln\left(x^2+1\right) \longrightarrow \dfrac{\frac{d}{dx}\left[x^2+1\right]}{x^2+1} = \dfrac{2x}{x^2+1}$

8. $f(x) = \ln\left(3x^2+1\right) \longrightarrow f'(x) = \dfrac{\frac{d}{dx}\left[3x^2+1\right]}{3} x^2{+}1 = \dfrac{6x}{3x^2+1}$

9. $f(x) = \ln\left(\sec x\right) \longrightarrow f'(x) = \dfrac{\sec x \tan x}{=} tanx \sec x$

10. $f(x) = \ln\left(\ln x\right) \longrightarrow f'(x) = \dfrac{\frac{d}{dx}\left[\ln x\right]}{\ln x} = \dfrac{\frac{1}{x}}{\ln x} = \dfrac{\frac{1}{x}}{\frac{\ln x}{1}} = \dfrac{1}{x} \cdot \dfrac{1}{\ln x} = \dfrac{1}{x \ln x}$