Differentiation - Chain Rule - Inverse Trig & Radical Forms

Find $f'(x)$.

1. $f(x) = \sin^{-1}\left(x^2\right)$

$$f'(x) = \frac{1}{\sqrt{1-\left(x^2\right)^2}}(2x) = \frac{2x}{\sqrt{1-x^4}}$$

2. $f(x) = \sqrt{1-x^4}$

$$f'(x) = \frac{1}{2}\left(1-x^4\right)^{-1/2}\left(-4x^3\right) = \frac{-2x^3}{\sqrt{1-x^4}}$$

3. $f(x) = \sec^{-1}\left(x^3\right)$

$$f'(x) = \frac{1}{x^3\sqrt{\left(x^3\right)^2-1}}\left(3x^2\right) = \frac{3}{x\sqrt{x^6-1}}$$

4. $f(x) = \sqrt{x^6-1}$

$$f'(x) = \frac{1}{2}\left(1-x^6\right)^{-1/2}\left(6x^5\right) = \frac{3x^5}{\sqrt{x^6-1}}$$

5. $f(x) = \sqrt{x^4-1}$

$$f'(x) = \frac{1}{2}\left(x^4-1\right)^{-1/2}\left(4x^3\right) = \frac{2x^3}{\sqrt{x^4-1}}$$

6. $f(x) = \sec^{-1}\left(x^2\right)$

$$f'(x) = \frac{1}{x^2\sqrt{\left(x^2\right)^2 - 1}}(2x) = \frac{2}{x\sqrt{x^4 - 1}}$$

7. $f(x) = \tan^{-1}\left(x^2\right)$

$$f'(x) = \frac{1}{\left(x^2\right)^2 + 1}(2x) = \frac{2x}{x^4 + 1}$$

8. $f(x) = \sin^{-1}\left(e^x\right)$

$$f'(x) = \frac{1}{\sqrt{1 - \left(e^x\right)^2}}\left(e^x\right) = \frac{e^x}{\sqrt{1 - e^{2x}}}$$

9. $f(x) = \sqrt{e^{2x} - 1}$

$$f'(x) = \frac{1}{2}\left(e^{2x} - 1\right)^{-1/2}\left(2e^{2x}\right) = \frac{e^{2x}}{\sqrt{e^{2x} - 1}}$$

10. $f(x) = \sec^{-1}\left(e^x\right)$

$$f'(x) = \frac{1}{e^x\sqrt{\left(e^x\right)^2 - 1}}\left(e^x\right) = \frac{1}{\sqrt{e^{2x} - 1}}$$