

$$1. f(x) = \sin^{-1}(x^2) \quad f'(x) = \frac{\frac{d}{dx}(x^2)}{\sqrt{1-(x^2)^2}} = \boxed{\frac{2x}{\sqrt{1-x^4}}}$$

$$2. f(x) = \tan^{-1}(x^3+1) \quad f'(x) = \frac{\frac{d}{dx}(x^3+1)}{1+(x^3+1)^2}$$

$$= \frac{3x^2}{1+x^6+2x^3+1} = \boxed{\frac{3x^2}{x^6+2x^3+2}}$$

$$3. g(x) = \sec^{-1}(x^3-3) \quad g'(x) = \frac{\frac{d}{dx}(x^3-3)}{|x^3-3|\sqrt{(x^3-3)^2-1}}$$

$$= \frac{3x^2}{|x^3-3|\sqrt{x^6-6x^3+9-1}} = \boxed{\frac{3x^2}{|x^3-3|\sqrt{x^6-6x^3+8}}}$$

$$4. h(x) = \cos^{-1}(\sin x) \quad h'(x) = -\frac{\frac{d}{dx} \sin x}{\sqrt{1-\sin^2 x}}$$

$$= \boxed{-\frac{\cos x}{\sqrt{1-\sin^2 x}}}$$

$$5. \cot^{-1}(x^3 + x^2) = f(x) \quad f'(x) = - \frac{\frac{d}{dx}(x^3 + x^2)}{1 + (x^3 + x^2)^2}$$

$$= - \frac{3x^2 + 2x}{x^6 + 2x^5 + x^4 + 1}$$

$$6. f(x) = \csc^{-1}(x^5) \quad f'(x) = - \frac{\frac{d}{dx} x^5}{|x^5| \sqrt{(x^5)^2 - 1}}$$

$$= - \frac{5x^4}{|x^4| \cdot |x| \sqrt{x^{10} - 1}} = - \frac{5}{|x| \sqrt{x^{10} - 1}}$$

$$7. f(x) = \sin^{-1}(e^{2x}) \quad f'(x) = \frac{\frac{d}{dx}(e^{2x})}{\sqrt{1 - (e^{2x})^2}} = \frac{2e^{2x}}{\sqrt{1 - e^{4x}}}$$

$$8. f(x) = \tan^{-1}(\cos 5x) \quad f'(x) = \frac{\frac{d}{dx} \cos 5x}{1 + \cos^2 5x} = \frac{-5 \sin 5x}{1 + \cos^2 5x}$$

$$9. h(x) = \sin^{-1}(\ln x) \quad h'(x) = \frac{\frac{d}{dx}(\ln x)}{\sqrt{1 - \ln^2 x}} = \frac{\frac{1}{x}}{\sqrt{1 - \ln^2 x}} = \frac{1}{x \sqrt{1 - \ln^2 x}}$$

$$10. h(x) = \sec^{-1}(x^4 - 1) \quad h'(x) = \frac{\frac{d}{dx}(x^4 - 1)}{|x^4 - 1| \sqrt{(x^4 - 1)^2 - 1}} = \frac{4x^3}{|x^4 - 1| \sqrt{x^8 - 2x^4 + 1 - 1}}$$

$$= \frac{4x^3}{|x^4 - 1| \sqrt{x^8 - 2x^4}} = \frac{4x^3}{|x^4 - 1| \sqrt{x^4} \sqrt{x^4 - 2}} = \frac{4x^3}{|x^4 - 1| (x^2) \sqrt{x^4 - 2}} = \frac{4x}{|x^4 - 1| \sqrt{x^4 - 2}}$$