$$\frac{d}{dx}\left[f(g(x))\right] =$$

$$\frac{d}{dx}\left[f(AT)\right] =$$

$$\frac{d}{dx}\left[f(g(x))\right] = f'(g(x)) \cdot \frac{d}{dx}(g(x))$$

$$\frac{d}{dx}\left[f(AT)\right] = f'(AT) \cdot \frac{d}{dx}(AT)$$

The derivative of the outside times the derivative of the inside.

$$f(x) = g(\sqrt[3]{x}) + 3x^4$$

Find $f'(x)$

$$f(x) = g(\sqrt[3]{x}) + 3x^4$$

$$f'(x) = g'(\sqrt[3]{x}) \cdot \frac{d}{dx}\left[x^{1/3}\right] + 12x^3$$

$$f'(x) = g'(\sqrt[3]{x}) \cdot \frac{1}{3}x^{-2/3} + 12x^3$$

$$f'(x) = \frac{g'(\sqrt[3]{x})}{3x^{2/3}} + 12x^3 = \frac{g'(\sqrt[3]{x})}{3(\sqrt[3]{x})^2} + 12x^3$$

Remember: $\frac{d}{dx}\left[g(AT)\right] = g'(AT) \cdot \frac{d}{dx}\left[AT\right]$

$f(x) = \sin(\sqrt{x})$

Find $f'(x)$

$f(x) = \sin(\sqrt{x})$ Find $f'(x)$

$f(x) = \sin(x^{1/2})$

$f'(x) = \cos(x^{1/2}) \cdot \frac{d}{dx}[x^{1/2}]$

$f'(x) = \cos(\sqrt{x}) \cdot \frac{1}{2}x^{-1/2}$

$f'(x) = \frac{\cos\sqrt{x}}{2\sqrt{x}}$

Remember $\frac{d}{dx}[\sin(AT)] = \cos(AT) \cdot \frac{d}{dx}[AT]$

$f(x) = \cos(e^{3x})$

Find $f'(x)$

$f(x) = \cos(e^{3x})$ Find $f'(x)$

$f'(x) = -\sin(e^{3x}) \cdot \frac{d}{dx}[e^{3x}]$

$f'(x) = -\sin(e^{3x}) \cdot e^{3x} \cdot \frac{d}{dx}[3x]$

$f'(x) = -\sin(e^{3x}) \cdot e^{3x} \cdot 3$

$f'(x) = -3\sin(e^{3x}) \cdot e^{3x}$

Remember $\frac{d}{dx}[\cos(AT)] = -\sin(AT) \cdot \frac{d}{dx}(AT)$

& $\frac{d}{dx}[e^{AT}] = e^{AT} \cdot \frac{d}{dx}[AT]$

$f(x) = \tan(2x+3)$

Find $f'(x)$

$f(x) = \tan(2x+3)$ Find $f'(x)$

$f'(x) = \sec^2(2x+3) \cdot \frac{d}{dx}[2x+3]$

$f'(x) = \sec^2(2x+3)[2]$

$f'(x) = 2\sec^2(2x+3)$

Remember $\frac{d}{dx}[\tan(AT)] = \sec^2(AT) \cdot \frac{d}{dx}[AT]$

$f(x) = \cot(\sin x)$

Find $f'(x)$

$f(x) = \cot(\sin x)$ Find $f'(x)$

$f'(x) = -\csc^2(\sin x) \cdot \frac{d}{dx}[\sin x]$

$f'(x) = -\csc^2(\sin x) \cdot \cos x$

$f'(x) = -\cos x \csc^2(\sin x)$

Remember $\frac{d}{dx}[\cot(AT)] = -\csc^2(AT) \cdot \frac{d}{dx}(AT)$

$f(x) = \sec(\pi x)$

Find $f'(x)$

$f(x) = \sec(\pi x)$ Find $f'(x)$

$f'(x) = \sec(\pi x)\tan(\pi x) \cdot \frac{d}{dx}[\pi x]$

$f'(x) = \sec(\pi x)\tan(\pi x)[\pi]$

$f'(x) = \pi \sec(\pi x)\tan(\pi x)$

Remember $\frac{d}{dx}[\sec(AT)] = \sec(AT)\tan(AT) \cdot \frac{d}{dx}(AT)$

$f(x) = \csc(\sqrt{5x})$

Find $f'(x)$

$f(x) = \csc(\sqrt{5x})$ Find $f'(x)$

$f(x) = \csc[(5x)^{1/2}]$

$f'(x) = -\csc(\sqrt{5x})\cot(\sqrt{5x}) \cdot \frac{d}{dx}[(5x)^{1/2}]$

$f'(x) = -\csc(\sqrt{5x})\cot(\sqrt{5x}) \cdot \frac{1}{2}(5x)^{-1/2} \cdot \frac{d}{dx}[5x]$

$f'(x) = -\csc(\sqrt{5x})\cot(\sqrt{5x}) \cdot \frac{1}{2} \cdot \frac{1}{\sqrt{5x}} \cdot 5$

$f'(x) = \frac{-5\csc(\sqrt{5x})\cot(\sqrt{5x})}{2\sqrt{5x}}$

Remember: $\frac{d}{dx}[\csc(AT)] = -\csc(AT) \cdot \cot(AT) \cdot \frac{d}{dx}[AT]$