If $c \in \mathbb{R}$ then $\dfrac{d}{dx}[c] \quad =$

If $n \in \mathbb{R}$ then $\dfrac{d}{dx}[x^n] \quad =$

$\dfrac{d}{dx}[e^x] \quad =$

$\dfrac{d}{dx}[\ln|x|] \quad =$

$\dfrac{d}{dx}[\sin x] \quad =$

$\dfrac{d}{dx}[\cos x] \quad =$

$\dfrac{d}{dx}[\tan x] \quad =$

$\dfrac{d}{dx}[\cot x] \quad =$

$\dfrac{d}{dx}[\sec x] \quad =$

$\dfrac{d}{dx}[\csc x] \quad =$

$\dfrac{d}{dx}[\arctan x] \quad =$

$\dfrac{d}{dx}[\arcsin x] \quad =$

$\dfrac{d}{dx}[\arccos x] \quad =$

If $y = f(x)$, then $y' =$

$\dfrac{d}{dx}[f(x) + g(x)] \quad =$

$\dfrac{d}{dx}[f(x) - g(x)] \quad =$

If $c \in \mathbb{R}$ then $\dfrac{d}{dx}[cf(x)] \quad =$

$\dfrac{d}{dx}[f(x)g(x)] \quad =$

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

$\dfrac{d}{dx}[f(g(x))] \quad =$

If $y = f(u), u = g(x),$ then $\dfrac{dy}{dx} \quad =$

If $a \in \mathbb{R}$ then $\dfrac{d}{dx}[a^x] \quad =$

If $u = f(x)$ then $\dfrac{d}{dx}[u^n] \quad =$

Steps in Implicit Differentiation of $F(x, y) = 0$:

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Steps in Logarithmic Differentiation of $y = f(x)$:

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-
-
-

If $c \in \mathbb{R}$ then $\frac{d}{dx}[c] = 0$

If $n \in \mathbb{R}$ then $\frac{d}{dx}[x^n] = nx^{n-1}$

$$\frac{d}{dx}[e^x] = e^x$$

$$\frac{d}{dx}[\ln|x|] = \frac{1}{x}$$

$$\frac{d}{dx}[\sin x] = \cos x$$

$$\frac{d}{dx}[\cos x] = -\sin x$$

$$\frac{d}{dx}[\tan x] = \sec^2 x$$

$$\frac{d}{dx}[\cot x] = -\csc^2 x$$

$$\frac{d}{dx}[\sec x] = \sec x \tan x$$

$$\frac{d}{dx}[\csc x] = -\csc x \cot x$$

$$\frac{d}{dx}[\arctan x] = \frac{1}{x^2+1}$$

$$\frac{d}{dx}[\arcsin x] = \frac{1}{\sqrt{1-x^2}}$$

$$\frac{d}{dx}[\arccos x] = -\frac{1}{\sqrt{1-x^2}}$$

If $y = f(x)$, then $y' = \frac{dy}{dx} = \frac{d}{dx}[y] = f'(x) = \frac{df}{dx} = \frac{d}{dx}[f(x)]$

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

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

If $c \in \mathbb{R}$ then $\frac{d}{dx}[cf(x)] = c\frac{d}{dx}[f(x)]$

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

$$\frac{d}{dx}\left[\frac{f(x)}{g(x)}\right] = \frac{g(x)\frac{d}{dx}[f(x)] - f(x)\frac{d}{dx}[g(x)]}{g^2(x)}$$

$$\frac{d}{dx}[f(g(x))] = \frac{d}{du}[f(u)] \cdot \frac{d}{dx}[g(x)],\ u = g(x)$$

If $y = f(u), u = g(x),$ then $\frac{dy}{dx} = \frac{dy}{du}\frac{du}{dx}$

If $a \in \mathbb{R}$ then $\frac{d}{dx}[a^x] = a^x \ln a$ (chain rule)

If $u = f(x)$ then $\frac{d}{dx}[u^n] = nu^{n-1}\frac{du}{dx}$

Steps in Implicit Differentiation of $F(x, y) = 0$:

- differentiate both sides of the equation with respect to x
- use chain rule when you encounter any y (ie., $\frac{d}{dx}[y^2] = 2y\frac{dy}{dx}$)
- solve the resulting equation for dy/dx

Steps in Logarithmic Differentiation of $y = f(x)$:

- take natural logarithm of both sides of equation
- use log laws to simplify
- implicitly differentiate with respect to x
- solve the resulting equation for dy/dx