كل شيء تحتاجه من ريفر١٠١ عشان ريفر١٠٦

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if (m && c == “Real numbers”) \\ $f(x) = mx + c$
{
$f`(x) = m$
}

else if (m == 0)
{
$\frac{d}{dx}(c) = 0$
}

else if (m == 1 && c == 0)
{
$\frac{d}{dx}(x) = 1$
}

else if (f && g is “differentiable”) && (c ==“real number”)
{
$(cf)`(x) = cf`(x);$ \\ example $\frac{d}{dx}(3x^2) = 3\frac{d}{dx}(x^2) = 3(2x) = 6x$
$(f + g)`(x) = f`(x) + g`(x)$ \\ example $\frac{d}{dx}(x^3 + 3x^2) = \frac{d}{dx}x^3 + \frac{d}{dx}3x^2 = 3x^2 + 6x$
$(f - g)`(x) = f`(x) - g`(x)$ \\ example $\frac{d}{dx}(x^3 - 3x^2) = \frac{d}{dx}x^3 - \frac{d}{dx}3x^2 = 3x^2 - 6x$
$(fg)`(x) = f(x)g`(x) + g(x)f`(x)$

$\left(\frac{f}{g}\right)`(x) = \frac{g(x)f`(x) - g(x)`f(x)}{(g(x)^2)}$ \\ must be g(x) != 0

}

$\frac{d}{dx}(\sin x) = \cos x$

$\frac{d}{dx}(\cos x) = -\sin x$

$\frac{d}{dx}(\tan x) = sec^2 x$

$\frac{d}{dx}(\csc x) = -\csc x \cot x$

$\frac{d}{dx}(\cot x) = -csc^2 x$

$\frac{d}{dx}(\sec x) = \sec x \tan x$

Chain Rule

let $y = f(u);\ u = g(x);\ g(x) \in D_f$;

if (g is "differentiable" at x) && (f is "differentiable" at u = g(x))

{

$y = f\ o\ g$ is differentiable at x;

$$\frac{dy}{dx} = \frac{dy}{du} * \frac{du}{dx}$$

$$\frac{dy}{dx} = f`(g(x))g`(x)$$

}

The General Power Rule

if (g == " differentiable" && r == "rational number")

{

$$\frac{d}{dx}\left((g(x))^r\right) = r(g(x))^{r-1}\frac{d}{dx}(g(x))$$

}

$$\frac{d}{dx}(\sin u) = \cos u\ \frac{du}{dx} \qquad \frac{d}{dx}(\cos u) = -\sin u\ \frac{du}{dx}$$

$$\frac{d}{dx}(\tan u) = sec^2 u\ \frac{du}{dx} \qquad \frac{d}{dx}(\cot u) = -csc^2 u\ \frac{du}{dx}$$

$$\frac{d}{dx}(\sec u) = \sec u \tan u\ \frac{du}{dx} \qquad \frac{d}{dx}(\cot u) = -\csc u \cot u\ \frac{du}{dx}$$

$$\frac{d}{dx}(\sin^{-1} u) = \frac{1}{\sqrt{1-u^2}}\ \frac{du}{dx} \qquad \frac{d}{dx}(\cos^{-1} u) = -\frac{1}{\sqrt{1-u^2}}\ \frac{du}{dx}$$

$$\frac{d}{dx}(\tan^{-1} u) = \frac{1}{1+u^2}\ \frac{du}{dx} \qquad \frac{d}{dx}(\cot^{-1} u) = -\frac{1}{1+u^2}\ \frac{du}{dx}$$

$$\frac{d}{dx}(\sec^{-1} u) = \frac{1}{u\sqrt{u^2-1}}\ \frac{du}{dx} \qquad \frac{d}{dx}(\csc^{-1} u) = -\frac{1}{u\sqrt{u^2-1}}\ \frac{du}{dx}$$

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