Review: Derivatives

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

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

$\frac{d}{dx}(e^x) = e^x$

$\frac{d}{dx}(\ln x) = \frac{1}{x}$

$\frac{d}{dx}(\tan x) =$ method #1: look it up

method #2: (if you insist) memorize it

method #3: (if you really insist)

$\tan x = \frac{\sin x}{\cos x} \Rightarrow$ quotient rule

similarly $\frac{d}{dx}(a^x)$ → if you need, look it up

$\frac{d}{dx}(\sin 4x) = 4\cos 4x$ (chain rule)

$\frac{d}{dx}$

$\frac{d}{dx}\left(e^{2x^2+3}\right) = 4x e^{2x^2+3}$

$\frac{d}{dx} \ln(\cos x) = \frac{1}{\cos x}(-\sin x) = -\tan x$

Review: Differentials

if $y = x^2$, what is dy?

recall: $dy = \frac{dy}{dx}\,dx$

$dy = 2x\,dx$

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if $u = \ln x$,

$du = \frac{1}{x}\,dx$

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if $y = e^x$, $dy = e^x\,dx$

if $y = \sin x$, $dy = \cos x \, dx$

if $u = x^2 + x$, $du = (2x+1) \, dx$