

BASE:

$$\text{Power: } ax^n$$

$$anx^{n-1}$$

$$\text{Product: } f(x)g(x)$$

$$f(x) \cdot g'(x) + g(x) \cdot f'(x)$$

$$\text{Quotient: } \frac{f(x)}{g(x)}$$

$$g(x) \cdot f'(x) - f(x) \cdot g'(x)$$

$$\text{Chain: } (x-a)^n$$

$$f'(g(x)) \cdot g'(x)$$

TRIG:

$$\sin x : \cos x$$

$$\cos x : -\sin x$$

$$\sec x : \sec x \tan x$$

$$\csc x : -\csc x \cot x$$

$$\tan x : \sec^2 x$$

$$\cot x : -\csc^2 x$$

SPECIAL:

$$\ln(u) : \frac{u'}{u}$$

$$e^u : e^u \cdot u'$$

$$a^u : \ln a \cdot a^u \cdot u'$$

$$\log_a u : \frac{u'}{\ln(a)u}$$

if $\sin 4x$ or $\sin^2 x$, you must use chain!

$$\sin 4x = \sin(4x)$$

$$\cos 4x \cdot 4$$

$$\sin^2 x = (\sin x)^2$$

$$2 \sin x \cdot \cos x$$

natural log has extra rules:

$$\text{power property: } \ln(u^x)$$

$$x \ln(u)$$

$$\text{product property: } \ln(a \cdot b)$$

$$\ln a + \ln b$$

$$\text{quotient property: } \ln\left(\frac{a}{b}\right)$$

$$\ln a - \ln b$$

$$\text{zero property: } \ln(1) = 0$$

natural log w/ e:

$$\ln e = 1$$

$$\ln e^x = x \ln e$$

$$e^{\ln x} = x$$

$$e^a \cdot e^b = e^{a+b}$$