Review (Test Wednesday)

Ex. $\frac{d}{dx}\left[x^3 e^{2x}\right] = \underbrace{x^3 \cdot e^{2x} \cdot 2}_{} + \underbrace{e^{2x} \cdot 3x^2}_{}$

$= x^2 e^{2x}(2x + 3)$

Ex. $\frac{d}{dx}\left[(x^2-4)^3\right]$

$= 3(x^2-4)^2 \cdot 2x = 6x(x^2-4)^2$

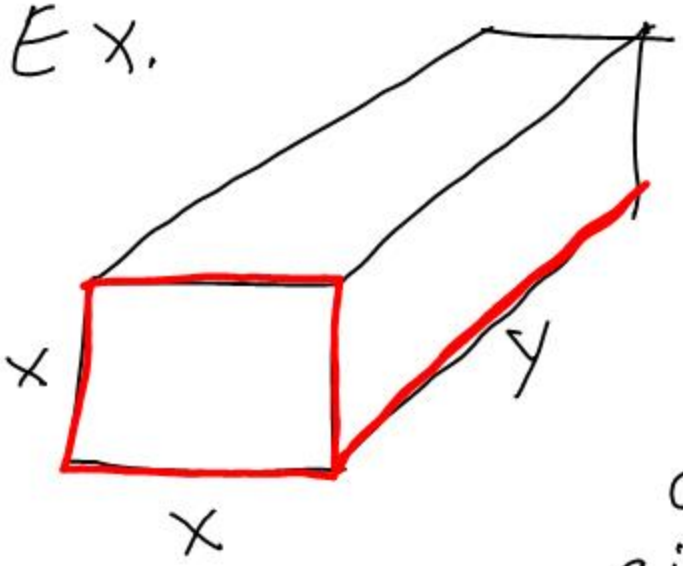
chain rule

Ex. $\frac{d}{dx}\left[\frac{e^{x^2+1}}{x^3+1}\right]$

$= \frac{(x^3+1)(e^{x^2+1} \cdot 2x) - (e^{x^2+1})(3x^2)}{(x^3+1)^2}$

$= \frac{x e^{x^2+1}(2x^3 + 2 - 3x)}{(x^3+1)^2}$

Ex.



The girth of a package is shown in red. A shipping company allows a maximum girth of 108". Find the dimensions of the box with maximum volume.

$V = x^2 y$

$4x + y = 108$

$y = 108 - 4x$

$V = x^2(108 - 4x)$

$V = 108x^2 - 4x^3$

$V' = 216x - 12x^2 = 0$

$12x(18 - x) = 0$

$x > 0$ ~~or~~ $x = 18$ in

$y = 108 - 4(18)$

$y = 36$ in