

When you wish to take the derivative of compositions of Functions we use what is known as the Chain Rule

$\frac{d}{dx} f(g(x)) = f'(g(x)) \cdot g'(x)$ . In alternate notation, we have if  $y = f(u)$  and  $u = g(x)$  then  $\frac{dy}{dx} = \frac{dy}{du} \cdot \frac{du}{dx}$ . To use this rule

basically you take the derivative of the outer function, leave the inner function alone, and multiply by the derivative of the inner function.

A special case of the Chain Rule is the GENERALIZED POWER RULE.  $\frac{d}{dx} [g(x)]^n = n[g(x)]^{n-1} \cdot g'(x)$

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Note: The chain rule can be used in conjunction with the product and quotient rules. In fact, you may use all three rules in a single problem, perhaps more than once.

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