

## Chain Rule:

The primary purpose of chain rule is to make sure that all parts of the function are derived. It is important to pay close attention to the function that you are differentiating to make sure that all of the inner functions are handled.

This rule works like unraveling layers of a onion. Take for instance the function:

$$f(x) = \sin(3x+4)$$

To find the derivative of the function above, the chain rule is applied. The first layer that needs to be derived is the outside sin function :

$$f(x) = (\cos)(3x+4)$$

The next layer is whatever is on the inside of the parenthesis. When all of the parts of the function are broken down and derived, they are multiplied together, so the final product looks like this:

$$f'(x) = 3\cos$$

Let's try a harder one.

$$f(x) = ((4x^3-2)^2)^3$$

$$\text{Step 1: } 3(4x^3-2)^2$$

$$\text{Step 2: } 6(4x^3-2)$$

$$\text{Step 3: } 72x^2$$