3.5: The Chain Rule

We know $\frac{d}{dx}(\sin x) = \cos x$. Does $\frac{d}{dx}(\sin(2x)) = \cos(2x)$?
(HINT: Rewrite the function as an identity, then differentiate).

Recall: The *composition* of 2 functions f and g is defined by

Define f and g for the above function.

The Chain Rule: If f and g are differentiable functions, $y = f(u)$ and $u = g(x)$, then

$$\frac{dy}{dx} =$$

An alternate version of the Chain Rule states that $\frac{d}{dx} f(g(x)) =$

Examples:

Find the derivatives of the following:

$f(x) = (x^3 - 4)^{10}$ $\qquad\qquad$ $y = \cos^3(2x)$.

Differentiate $y = \dfrac{(3x-2)^4}{(2x+5)^3}$ two different ways.

Given functions f and g such that $f(4) = 2$, $f'(4) = 2$, $g(1) = 4$, $g'(1) = 2$, find $h'(1)$ if $h(x) = f(g(x))$

On Your Own: #3, 7, 11, 13, 27, 33, 49, 51, 57, 59, 79, 80