

Composition of Functions

Recall: $g \circ h(x) = g(h(x))$

Example: $g(x) = x^2$

$$h(x) = x^3 - x$$

$$g \circ h(x)$$

Example: $f(x) = (x^2 + 1)^{162}$

$$f(x) = g(h(x))$$

$$g(x) =$$

$$h(x) =$$

Recall: $g \circ h(x) = g(h(x))$

g depends on x , so we can compute the derivative $\frac{dg}{dx}$

$$\frac{dg}{dx} = \lim_{\Delta x \rightarrow 0} \frac{g(x + \Delta x) - g(x)}{\Delta x} =$$

g depends on h , so we can compute the derivative $\frac{dg}{dh}$

$$\frac{dg}{dh} \approx$$

h depends on x , so we can compute the derivative $\frac{dh}{dx}$

$$\frac{dh}{dx} \approx$$

$$\frac{dg}{dx} =$$

Example: $h(x) = x^3 - x$

$$g(h) = h^2$$

$$g \circ h(x) = (x^3 - x)^2$$

$$\frac{d}{dx}((x^3 - x)^2) =$$

Example: $(x^2 + 1)^{162}$

Find $\frac{d}{dx}((x^2 + 1)^{162})$

Example: e^{3x-1}

Find $\frac{d}{dx}(e^{3x-1})$

Recall: $e^{\ln(x)} = x$

$$\frac{d}{dx}(e^{\ln(x)}) =$$

Example 1: $f(x) = 3 + 2x - 5x^2 + 4\ln(x)$

$$\frac{df}{dx} =$$

Example 2: $f(x) = \ln(x + x^2)$

$$\frac{df}{dx} =$$

Example 3: $f(x) = \ln(h(x))$

$$\frac{df}{dx} =$$