

SECTION 3.4 THE CHAIN RULE

1. For each function $H(x)$ below, write it as a (nontrivial) composition of functions in the form $f(g(x))$.

(a) $H(x) = \tan(2 - x^4)$

(b) $H(x) = e^{2-2x}$

2. Complete the Chain Rule (using both types of notation)

• If $F(x) = f(g(x))$,

then $F'(x) =$

• If $y = f(u)$ and $u = g(x)$,

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

3. Find the derivative of the function. You do not need to simplify your answer.

(a) $y = \sqrt[3]{4 - 2x}$

(b) $f(x) = 0.04 \sin(3x + e^x)$

(c) $x(t) = \frac{e^{-\pi t^2/10}}{100}$ (**Don't** use the quotient rule here!)

(d) $g(x) = \frac{50\sqrt{2}}{x + \tan x}$ (**Don't** use the quotient rule here!)

4. Suppose that $f(x) = x^3$, $g(x) = \cos(x)$ and $h(x) = 7 + e^x$.

(a) Find $F(x) = f(x)(g(h(x)))$, then find its derivative.

(b) Find $G(x) = f(g(x)h(x))$, then find its derivative.

(c) Find $K(x) = \frac{g(x)}{h(f(x))}$, then find its derivative.

(d) Find $G(x) = f(g(h(x)))$, then find its derivative.