

Quiz 6Name: MEExplain your solution process clearly.
Write legible.1. [3 points] Consider the function $h(t) = g(2g(3g(t)))$.(a) Find the derivative of h in terms of g and its derivative.

$$h'(t) = g'(2g(3g(t))) \cdot 2g'(3g(t)) \cdot 3g'(t) \quad \text{by using chain rule 3 times.}$$

(b) Suppose $g(0) = 0$ and $g'(0) = 4$, find $h'(0)$.

$$(a) \Rightarrow h'(0) = g'(0) \cdot 2g'(0) \cdot 3g'(0) = 4 \cdot 2 \cdot 4 \cdot 3 \cdot 4 = \underline{6 \cdot 4^3}$$

2. [3 points] Consider the function $h(t) = f(t) \cdot g(t) / (\sqrt{t} + 1)$.(a) Find the derivative of h in terms of f , g , their derivatives and t .

$$h'(t) = \frac{(f'(t) \cdot g(t) + f(t) \cdot g'(t))(\sqrt{t} + 1) - f(t) \cdot g(t) \cdot \frac{1}{2\sqrt{t}}}{(\sqrt{t} + 1)^2}$$

Using product rule and quotient rule.

(b) Suppose $f(1) = 1$, $g(1) = 2$, $f'(1) = 3$, $g'(1) = 4$. Find $h'(1)$.

$$(a) \Rightarrow h'(1) = \frac{(3 \cdot 2 + 1 \cdot 4)(2) - 1 \cdot 2 \cdot \frac{1}{2}}{2^2} = \frac{20 - 1}{4} = \underline{\underline{\frac{19}{4}}}$$

3. [4 points] Find the derivatives of the following functions.

(a) $y = x^2 \sin(\pi x)$,

$$\Rightarrow y' = 2x \cdot \sin(\pi x) + x^2 \cdot \cos(\pi x) \cdot \pi \quad \text{by product rule \& chain rule}$$

(b) $y = \sqrt{3 - 5x}$.

$$\Rightarrow y' = \frac{1}{2} (3 - 5x)^{-\frac{1}{2}} \cdot (-5) \quad \text{by chain rule and power rule}$$