

Math 131 - Assignment 6

March 5, 2025

Name _____

Score _____

Show all work to receive full credit. Supply explanations when necessary. Use extra paper as necessary. This assignment is due March 12.

1. Determine each derivative.

(a) $\frac{d}{dx} \sin^2(x^2)$

(b) $\frac{d}{dx} \left(\frac{x}{\sqrt{x^4 + 4}} \right)$

2. Find all points on the graph of $y = \sqrt[3]{(x^2 - 1)^2}$ at which $dy/dx = 0$ or dy/dx is not defined.

3. You are given the following information:

$$g(5) = -3, \quad g'(5) = 6, \quad h(5) = 3, \quad h'(5) = -2.$$

For each part below, use the information to determine $f'(5)$. If it is not possible to do so, say what additional information would be required.

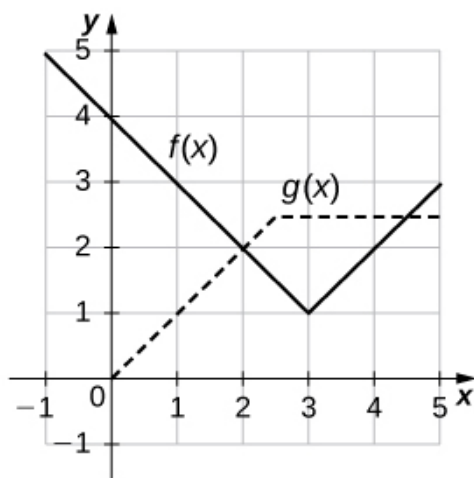
(a) $f(x) = g(x)h(x)$

(b) $f(x) = \frac{g(x)}{h(x)}$

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

(d) $f(x) = [g(x)]^3$

4. The graphs of f and g are shown below. Use the chain rule and information from the graphs to determine the derivative of $g(f(x))$ when $x = 1$.



5. Given the equation $x^3 + 8xy + y^3 = 25x$, use implicit differentiation to determine $\frac{dy}{dx}$ at the point $(x, y) = (1, 2)$.

6. Given the equation $y^3 + y^2 - 5y - x^2 = -4$, use implicit differentiation to determine $\frac{dy}{dx}$.

7. Find equations for the tangent line and normal line at the point $(2, 3)$.

$$x^3 + y^3 = 6xy - 1$$