Math 131 - Assignment 6

Name _____

February 28, 2024

Score _____

Show all work to receive full credit. Supply explanations when necessary. Use extra paper as necessary. This assignment is due March 6.

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1. Determine each derivative.

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

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

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.

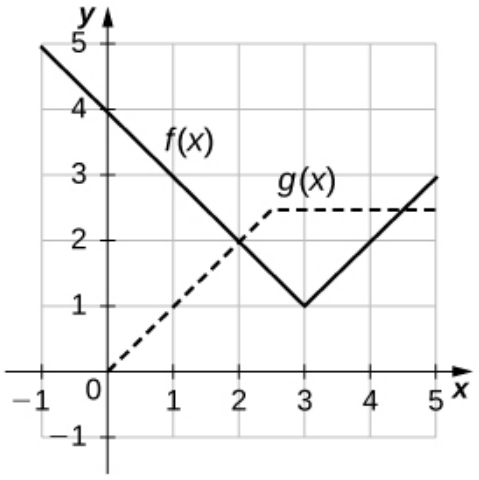
(a) $f(x) = g(x)h(x)$

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

(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 $\dfrac{dy}{dx}$ at the point $(x, y) = (1, 2)$.

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

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

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

8. Let $f(x) = x^5 + 7x - 9$.

   (a) Compute $f^{-1}(-1)$.

   (b) Compute $(f^{-1})'(-1)$.

   (c) Compute $f^{-1}(11)$. (You'll probably have to use a calculator to approximate the value.)

   (d) Compute $(f^{-1})'(11)$.