Name: _____

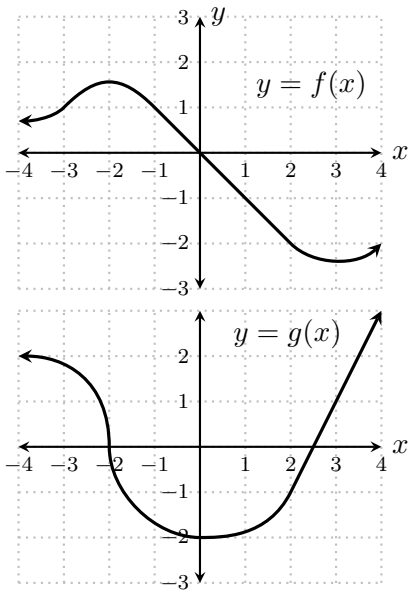
Test 2 ♢

MATH 200

March 6, 2026

Directions: Each question is 5 points. Closed book, no calculators. Put phones away. Put your answer in a box.

1. Answer the questions about the functions graphed below.



   (a) $g'(3) =$

   (b) $f'(3) =$

   (c) $\lim_{x \to -2} g'(x) =$

   (d) If $h(x) = f\big(g(x)\big)$, then $h'(3) =$

   (e) If $h(x) = f(x)g(x)$, then $h'(0) =$

2. (8 points) Find the derivatives of the following functions.

   (a) $f(x) = e^x + 3x^4 + \pi^2$

   (b) $f(x) = \sec^{-1}(x)$

   (c) $f(x) = e^{3x}$

   (d) $f(x) = \sin(\pi x)$

3. Find the equation of the tangent line to the graph of $y = \tan^{-1}(x)$ at the point where $x = 1$. Show work.

4. $\dfrac{d}{dx}\left[\dfrac{1}{(3x+1)^7}\right] =$

5. $\dfrac{d}{dx}\left[\ \dfrac{x}{e^x}\ \right] =$

6. $\dfrac{d}{dx}\left[\ x^2 \sin\left(x^2\right)\ \right] =$

7. $\dfrac{d}{dx}\left[\sqrt{\ln\left(x^4+x^2+1\right)}\ \right] =$

8. Suppose $y = \ln(x) - \dfrac{1}{x} + \dfrac{1}{2}$.

   (a) $\dfrac{dy}{dx} =$

   (b) $\dfrac{d^2y}{dx^2} =$

9. Given the equation $x^4 + 2y + y^4 = \cos(x)$, find y'. Show work.

10. A function $f(x)$ is graphed below. Sketch the graph of its derivative $f'(x)$.