1. Let $f(x)$ be a differentiable function such that $g(x) = \ln(f(\sin^{-1}(x)))$. $g'(x) = $?

a) $\dfrac{f'(\sin^{-1}(x))}{\sqrt{1-x^2}}$

b) $\dfrac{f'(\sin^{-1}(x))}{f(\sin^{-1}(x))}$

c) $\dfrac{f'(\sin^{-1}(x))}{x\sqrt{1-(\ln x)^2}}$

d) $\dfrac{f'(\sin^{-1}(x))}{f(\ln x)\sqrt{x^2-1}}$

e) $\dfrac{f'(\sin^{-1}(x))}{f(\sin^{-1}(x))\sqrt{1-x^2}}$

Use the table below to calculate each value in the following three problems.

x	f(x)	f'(x)	g(x)	g'(x)
-2	-6	9	-10	16
1	5	-3	3	-2
3	1	7	8	3

2. If $h(x) = f(g(x))$, find $h'(1)$.

3. If $h(x) = f(-x)$, find $h'(-1)$.

4. If $h(x) = f^{-1}(x)$, find $h'(1)$.

5. A decreasing function $g(x)$ satisfies $g(4) = 6$ and $g'(4) = -2$. Which of the following about the inverse of $g(x)$ must be true?

    a) $(g^{-1})'(6) = 4$

    b) $(g^{-1})'(-2) = 4$

    c) $(g^{-1})'(6) = -2$

    d) $(g^{-1})'(6) = -\frac{1}{2}$

6. Let $f(x) = g^{-1}(x)$ such that $f(x)$ and $g(x)$ are differentiable. If $f(-5) = 7$ and $g'(7) = 3$, which of the following statements must be false?

    I. $\quad f'(3) = -\frac{1}{3}$

    II. $\quad f'(-5) = \frac{1}{3}$

    III. $\quad f'(7) = \frac{1}{3}$

    a) I only
    b) II only
    c) III only
    d) I and III only

7. The graph of $y = e^{tanx} - 2$ crosses the x-axis at one point in the interval $[0, 1]$. What is the slope of the graph at this point?

a) 0.606   b) 2   c) 2.242   d) 2.961   e) 3.747

8. The function $f(x) = 2x^3 - x$, $x \geq 1$, is one-to-one and has an inverse function $g(x)$. Select the correct equation of the tangent line to the graph of $g(x)$ at $x = 14$ on $g(x)$.

    a) $y - 2 = \frac{1}{23}(x - 14)$

    b) $y + 2 = \frac{1}{23}(x - 14)$

    c) $y + 2 = -\frac{1}{23}(x + 14)$

    d) $y - 2 = -\frac{1}{23}(x - 14)$

9. An object is moving along the y-axis. Its position (in centimeters) at time $t > 0$ seconds is given by $y(t) = tan^{-1}t$.

    a) What is the velocity at 3.2 seconds? (Round to 3 decimal places.)

    b) What is the acceleration at 1 second? (Leave the answer as a simplified fraction.)

10. Determine the derivative of $f(x) = log_3(x^2 - 4)$.

11. If $f(x) = ln(x^4(x + 3)^3)$, evaluate $f'(1)$.

12. What is the derivative of $y = \frac{e^x(x^2+4)}{x-2}$?

Differentiate each function with respect to x.

13. $y = ((-4x^2 - 3)^4 - 1)^5$

14. $y = (-5x^3 - 1)^3 (5x^5 + 1)^4$

15. $y = (\dfrac{x^5 + 5}{-5x^3 + 4})^4$

Use implicit differentiation to find $\frac{dy}{dx}$ in terms of x and y.

16. $5x^3 y^3 + y^2 = 4x + e^{x^2 y}$

17. $2x^3 + 4 = sec(2x^2 y^2)$