1. Find the domain of the function \( g(x) = \frac{1}{\sqrt{x^2 - 6x}} \).

2. Sketch the graph of \( y = x \sin(x) \) for \(-2\pi \leq x \leq 2\pi\).

3. Sketch the graph of the function \( f(x) = x^3 + 1 \). Find a formula for its inverse \( f^{-1} \) and sketch the graph of \( f^{-1} \) on the same plot.

4. Determine the infinite limit \( \lim_{x \to 0} \frac{x - 1}{x^3(x + 3)} \).

5. Evaluate the limit \( \lim_{x \to 2} \frac{x^2 - 4}{x^3 - 8} \).

6. If \( f(x) = x^2 \), find a number \( \delta \) so that \( |f(x) - 1| < 1/2 \) whenever \( |x - 1| < \delta \).

7. Find the numbers at which \( f \) is discontinuous, where \( f \) is defined by \( f(x) = x + 1 \) if \( x \leq 1 \), \( f(x) = 1/x \) if \( 1 < x < 3 \), \( f(x) = \sqrt{x - 3} \) if \( x \geq 3 \).

8. What is \( \lim_{x \to +\infty} \sqrt{\frac{12x^3 - 5x + 2}{1 + 4x^2 + 3x^3}} \)?

9. Find the equation of the tangent line to the curve \( y = x^4 - 1 \) at the point where \( x = 1 \).

10. State the definition of the derivative of a function, and find the derivative of the function \( f(x) = x^3 \) using the definition of the derivative.

11. Sketch the graph of a function for which \( f(0) = 0 \), \( f'(0) = -1 \), \( f(1) = 0 \), \( f'(1) = -1 \).

12. Differentiate the function \( y = e^{x+2} + 4\pi^2 + (x^2 + 1)/\sqrt{x} \).

13. At what point on the curve \( y = 2 + 2e^x - 3x \) is the tangent line parallel to the line \( 3x - y = 1 \)?

14. Differentiate \( x^2e^x(\sqrt{x} - 1) \).

15. Differentiate \( \frac{\sqrt{x} + 1}{\sqrt{x} - 1} \).