1. Use the definition of the derivative to differentiate \( g(t) = \left( \frac{1}{t^2} \right) \)

2. a. Use the definition of the derivative to differentiate \( y = \sqrt{x + 4} \).

b. Then find the equation of the tangent line to this curve at the point (5,3).

3. Let \( f(x) = \begin{cases} x^2 + 1 & \text{if } x \geq 1 \\ 2x & \text{if } x < 1 \end{cases} \).

   a. Is \( f(x) \) continuous at \( x = 1 \)?

   b. Use the definition of the derivative to find \( f'(x) \) for \( x > 1 \).

   c. Use the definition of the derivative to find \( f'(x) \) for \( x < 1 \).

   d. Is \( f \) differentiable at \( x = 1 \)? Explain your answer.
4. Find the function f'(x). Then evaluate the derivative at each of the values of x given.

   a) \( f(x) = 1 - x - x^2 \);   \( x = -1, 0 \)

   \[ f'(-1) = \quad \text{__________} \]

   \[ f'(0) = \quad \text{__________} \]

   b) \( f(x) = \frac{1}{\sqrt{x}} \);     \( x = 4, 9 \)

   \[ f'(4) = \quad \text{__________} \]

   \[ f'(9) = \quad \text{__________} \]

5. The tangent line to the graph of a function f at (1,3) passes through the point (2,-4). What is \( f'(1) \)?

6. Suppose that the tangent line to the graph of \( y = f(x) \) at \( x = 2 \) is described by the equation \( y = 4x + 3 \). Find \( f(2) \) and \( f'(2) \).

   \[ f(2) = \quad \text{__________} \quad f'(2) = \quad \text{__________} \]

7. Let \( f(x) \) be a quadratic polynomial function. Make a conjecture about the graph of \( f'(x) \) in general. Prove your conjecture.

8. Given the following graphs, match the graph of each function with its derivative.

   Graphs of functions:
   
   \[ \text{A} \quad \text{B} \quad \text{C} \quad \text{D} \]

   Graphs of derivatives:
   
   \[ \text{1} \quad \text{2} \quad \text{3} \quad \text{4} \]