1. \( f(x) = \begin{cases} 
   x + 1 & x \leq 1 \\
   \frac{1}{x} & 1 < x < 3 \\
   \sqrt{x - 3} & x \geq 3 
\end{cases} \). Determine

1a. \( \lim_{x \to 3^-} f(x) \).

1b. \( \lim_{x \to 3^+} f(x) \).

1c. \( \lim_{x \to 3} f(x) \).

1d. Is \( f(x) \) continuous at \( x = 3 \)? If not, what kind of discontinuity is it?

2. Determine \( \lim_{x \to 4} \frac{x^2 - 4x}{x^2 - 3x - 4} \).

3. Determine \( \lim_{x \to 0} \frac{\sin 7x}{4x} \).

4. Use the limit definition of derivative to calculate \( f'(x) \)
where \( f(x) = 4x^2 - 2x + 3 \).
For the remaining problems, you do not need to use the limit definition of derivative.

5. Determine $f'(x)$ where $f(x) = 2\sqrt{x^3 + \frac{3}{x^2}}$.

6. Determine $f'(x)$ where $f(x) = \left(x^2 + x^{-1}\right)(x^5 - 2x^2)$.

7. Determine $f'(x)$ where $f(x) = \frac{x^3 + x}{x^4 - 2}$.

8. Find the point(s) on the curve $y = x^3 - 3x^2 + 1$ where the tangent line is horizontal.

9. Write an equation of the tangent line to $y = x^3 - 5x + 1$ at (1, -3).

10. The position of a particle is given by $s = t^3 - 6t^2 + 9t$. When is the particle at rest?