1. Evaluate the following limits, if they exist. If a limit does not exist, explain why.

(a) \( \lim_{x \to \infty} \frac{1853}{x} \)
(b) \( \lim_{x \to 1} \frac{x - 3}{x^2 + 2x - 15} \)
(c) \( \lim_{x \to 3} \frac{x - 3}{x^2 + 2x - 15} \)
(d) \( \lim_{x \to -2} 6 - x^2 \)

2. Evaluate the following limits, if they exist. If a limit does not exist, explain why.

(a) \( \lim_{x \to 3} \frac{\frac{1}{x} - \frac{1}{3}}{x - 3} \)
(b) \( \lim_{x \to 0} \frac{x}{|x|} \)
(c) \( \lim_{x \to \infty} \frac{5x^2 + 1}{1 - x^2 + \sqrt{4x^4 + 2x}} \)
(d) \( \lim_{x \to -\infty} \frac{x + 2}{x^2 + 4x + 4} \)

3. Evaluate \( \lim_{h \to 0} \frac{(x + h)^2 - x^2}{h} \), where \( a \) is a constant.

4. Find all (vertical, horizontal, slant) asymptotes for the following functions. For each asymptote, state what kind it is (VA, HA, or SA) and write its equation.

(a) \( \frac{2x^3 + x + 2}{x^2 + 1} \)
(b) \( \frac{3x^2 + 2}{x^3 - x} \)

5. Let

\[ g(x) = \begin{cases} 
ax^2 + bx + 1 & \text{if } x < 2 \\
& \text{if } x = 2 \\
4 - 2x & \text{if } x > 2 
\end{cases} \]

Find values of \( a \) and \( b \) for which \( g \) is continuous at \( x = 2 \).

6. Use the Intermediate Value Theorem to show that the equation \( x^3 + x^2 - 2x - 4 = 0 \) has a solution in the interval \([1, 2]\). Your answer should make reference to all hypotheses in the IVT.