Instructions  Please write your name in the upper right-hand corner of the page. Write complete sentences to explain your solutions.

1. Write down a function \( f(x) \) whose graph looks like the picture. The key features of the picture are that \( \lim_{x \to 1^+} f(x) = \infty \), \( \lim_{x \to 1^-} f(x) = -\infty \), \( \lim_{x \to \infty} f(x) = 2 \), and \( \lim_{x \to -\infty} f(x) = 2 \). Explain the reasoning for your choice of \( f(x) \).
2. The TI-89 calculator says that \( \lim_{x \to 1} \left( \frac{1}{x - 1} - \frac{2}{x^2 - 1} \right) = \frac{1}{2} \). Supply a computation that confirms this value. (Suggestion: combine the fractions with a common denominator and simplify.)

3. Find a number \( c \) such that \( \lim_{x \to \infty} \left( \sqrt{x^2 + cx} - x \right) = 3. \)