

Section 2.3: Calculating Limits Using Limit Laws

Problem 1. Evaluate each of the following limits if they exist.

$$(a) \lim_{x \rightarrow -3} \frac{x^2 + 3x}{x^2 - x - 12},$$

$$(b) \lim_{x \rightarrow 3} \frac{\frac{1}{x} - \frac{1}{3}}{x - 3},$$

$$(c) \lim_{x \rightarrow 9} \frac{9 - x}{3 - \sqrt{x}}$$

$$(d) \lim_{x \rightarrow 4} |x - 4| + 2x.$$

Section 2.5: Continuity

Problem 2. Use the Squeeze Theorem to show that $\lim_{x \rightarrow 0} \sqrt{x^4 + x^2} \sin\left(\frac{\pi}{x}\right) = 0$.

Problem 3. Sketch the graph of a function f that is defined on the set of real numbers (meaning $\mathbb{R} = (-\infty, \infty)$) that is continuous, except for the following discontinuities:

Jump discontinuity at $x = -3$, removable discontinuity at $x = 4$.

Problem 4. Clearly explain why the function $f(x) = \frac{x^2}{\sqrt{x^4+2}}$ is continuous at every number in its domain. State the domain of the function.