

**Problem 1.** Compute the following limits using a graph.

(a)  $\lim_{x \rightarrow 5} (x + 1)/2$

(b)  $\lim_{x \rightarrow 2} \frac{x^2 - 4x + 4}{x - 2}$

(c)  $f(x) = \begin{cases} x - 1 & \text{if } x \leq 0 \\ x^2 & \text{if } x > 0 \end{cases}$

$$\lim_{x \rightarrow 0^+} f(x)$$

$$\lim_{x \rightarrow 0^-} f(x)$$

$$\lim_{x \rightarrow 0} f(x)$$

**Problem 2.** Explain in your own words (and complete sentences) what is meant by the equation

$$\lim_{x \rightarrow 2} f(x) = \infty.$$

What does this statement tell you about  $f(2)$ ?

**Problem 3.** Sketch the graph of an example of a function  $f$  that satisfies:

$$\lim_{x \rightarrow 0^-} f(x) = -1 \qquad \lim_{x \rightarrow 0^+} f(x) = 2 \qquad f(0) = 1$$

**Problem 4.** Sketch the graph of an example of a function  $f$  that satisfies:

$$\begin{array}{lll} \lim_{x \rightarrow 3^+} f(x) = 4 & \lim_{x \rightarrow 3^-} f(x) = 2 & \lim_{x \rightarrow -2} f(x) = 2 \\ f(3) = 3 & f(-2) = 1 & \end{array}$$

**Problem 5.** Let  $f(x) = 2x$ .

(a) State, using the precise definition of limit, what it means to say

$$\lim_{x \rightarrow 0} f(x) = 0$$

(b) Prove that this is, in fact, true (drawing the graph of  $f$  should help).