

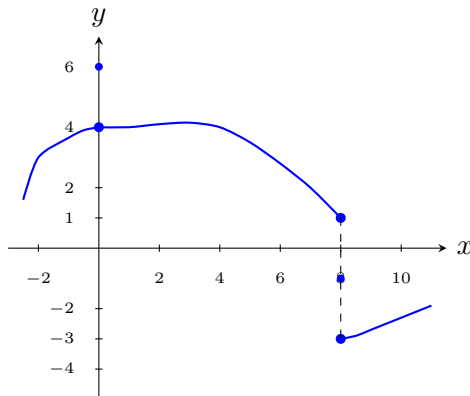
MATH 31 - Calculus. Homework 1. Due Th. 09/10/2026. Professor Luis Fernández

SOLUTION

Please write your answers here.

1. Sketch the graph of an example of a function f that satisfies the following conditions:

$$\lim_{x \rightarrow 0} f(x) = 4, \quad \lim_{x \rightarrow 8^-} f(x) = 1, \quad \lim_{x \rightarrow 8^+} f(x) = -3. \quad f(0) = 6, f(8) = -1.$$



2. Compute $\lim_{x \rightarrow 2} (3x^2 - 4x + 1)$.

$$\lim_{x \rightarrow 2} (3x^2 - 4x + 1) = 3(2)^2 - 4(2) + 1 = 12 - 8 + 1 = 5.$$

3. Compute $\lim_{x \rightarrow 3} \frac{x^2 - 9}{x - 3}$.

$$\begin{aligned} \lim_{x \rightarrow 3} \frac{x^2 - 9}{x - 3} &= \lim_{x \rightarrow 3} \frac{(x - 3)(x + 3)}{x - 3} \\ &= \lim_{x \rightarrow 3} (x + 3) \\ &= 6. \end{aligned}$$

4. Compute $\lim_{x \rightarrow 0} \frac{\sqrt{x+4} - 2}{x}$.

$$\begin{aligned} \lim_{x \rightarrow 0} \frac{\sqrt{x+4} - 2}{x} &= \lim_{x \rightarrow 0} \frac{\sqrt{x+4} - 2}{x} \cdot \frac{\sqrt{x+4} + 2}{\sqrt{x+4} + 2} \\ &= \lim_{x \rightarrow 0} \frac{x}{x(\sqrt{x+4} + 2)} \\ &= \lim_{x \rightarrow 0} \frac{1}{\sqrt{x+4} + 2} \\ &= \frac{1}{4}. \end{aligned}$$