

1. Let $f(x) = \begin{cases} \frac{x^2 - 9}{x + 3} & , \quad \text{if } x < 0 \\ & , \\ \frac{x^2 - 9}{x - 3} & , \quad \text{if } x > 0 \end{cases}$

Find each indicated limit or explain why it does not exist:

(a) $\lim_{x \rightarrow -3} f(x)$

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

2. For the function $f(x) = 1 + \sqrt{x}$ compute the following limit: $\lim_{h \rightarrow 0} \frac{f(2+h) - f(2)}{h}$

3. Solve the inequality $\frac{x^2 + 5x}{x - 3} > 0$ using a sign chart. Express the answer using interval notation.

4. Let $f(x) = \begin{cases} \frac{x-2}{x^2-4} & , \text{ if } x \neq 2 \\ 1 & , \text{ if } x = 2 \end{cases}$

Is f continuous at $x = 2$? Carefully explain why or why not using the definition of continuity.