3.2 - Limits and Continuity

One-sided limits help define **continuity**:

A function f is continuous at a number $x = a$ if

(1) $f(x)$ is defined

(2) $\lim_{x \to a} f(x)$ exists

(3) $\lim_{x \to a} f(x) = f(x)$

If not, the function f is discontinuous at $x = a$.

Further, f is continuous on an interval I if it is continuous at every number in I.

Example: $f(x) = \begin{cases} x + 1, & x \geq 0 \\ x - 1, & x < 0 \end{cases}$

Example: $f(x) = \begin{cases} \sqrt{x}, & x > 0 \\ -x, & x \leq 0 \end{cases}$

Example: $h(x) = \begin{cases} x + 2, & x \neq 2 \\ 1, & x = 2 \end{cases}$ Graph *h (x).* Is *h (x)* continuous at $x = 2$?