# Section 7.2    Left- and Right-Handed Limits

**Problem 1.**

(a) $\lim\limits_{W \to 1^-} f(W) = 0.32$.

(b) $\lim\limits_{W \to 1^+} f(W) = 0.55$.

(c) $\lim\limits_{W \to 1} f(W)$ does not exist.

(d) $\lim\limits_{W \to 1.5} f(W) = 0.55$.

(e) $\lim\limits_{W \to 2} f(W)$ does not exist.

(f) $\lim\limits_{W \to 12^+} f(W) = 12$.

(g) $\lim\limits_{W \to 12^-} f(W) = 12$.

(h) $\lim\limits_{W \to 12} f(W) = 12$.

### Problem 5.
$$f(x) = \begin{cases} 3x + 4 & \text{if } x < 0 \\ 2x + 4 & \text{if } x \le 0 \end{cases}$$

(a) $\lim\limits_{x \to 1} f(x) = \lim\limits_{x \to 1}(2x + 4) = 6$

(b) $\lim\limits_{x \to -2} f(x) = \lim\limits_{x \to -2}(3x + 4) = -2$

(c) $\lim\limits_{x \to 0^+} f(x) = \lim\limits_{x \to 0^+}(2x + 4) = 4$

(d) $\lim\limits_{x \to 0^-} f(x) = \lim\limits_{x \to 0^-}(3x + 4) = 4$

(e) $\lim\limits_{x \to 0} f(x) = 4$

### Problem 10.

(a) $\lim\limits_{x \to -\infty} f(x) = 0$

(b) $\lim\limits_{x \to -7} f(x) = DNE$

(c) $\lim\limits_{x \to -5^+} f(x) = -1$

(d) $\lim\limits_{x \to -5} f(x) = DNE$

(e) $\lim\limits_{x \to -2} f(x) = 2$

(f) $\lim\limits_{x \to 2^+} f(x) = 1$

(g) $\lim\limits_{x \to \infty} f(x) = 1$

(h) $\lim\limits_{x \to 0} f(x) = 0$

## Problem 2.

(a) $\infty$

(b) $\infty$

(c) $\infty$

(d) $\infty$

(e) $-\infty$

(f) 8

### Problem 7.
$f(x) = \frac{1}{x+2}$, $D_f : x \neq -2$.
$x = -2$ is NOT a removable point of discontinuity.

### Problem 8.
The function is continuous on $(-\infty, \infty)$.

### Problem 9.
$f(x) = \begin{cases} -x^2 - 1 & , x > 0 \\ 5x - 1 & , x < 0 \end{cases}$   $x = 0$ is a removable point of discontinuity, since we can define $f(x)$ to be
$-1$ at $x = 0$, making our function continuous on $(-\infty, \infty)$

## Problem 15.

(a) Yes

(b) Yes, $f'(0) = 0$