Math 141: Accelerated Calculus I

6 (a) $\lim_{x \to -2^-} g(x) = -1$ (b) $\lim_{x \to -2^+} g(x) = 1$

(c) Since the left (a) and right (b) limits are different, $\lim_{x \to -2} g(x)$ does not exist.

(d) $g(-2) = 1$

(e) $\lim_{x \to 2^-} g(x) = 1$ (f) $\lim_{x \to 2^+} g(x) = 2$.

(g) Since the left and right limits are different, $\lim_{x \to 2} g(x)$ does not exist.

(h) $g(2) = 2$

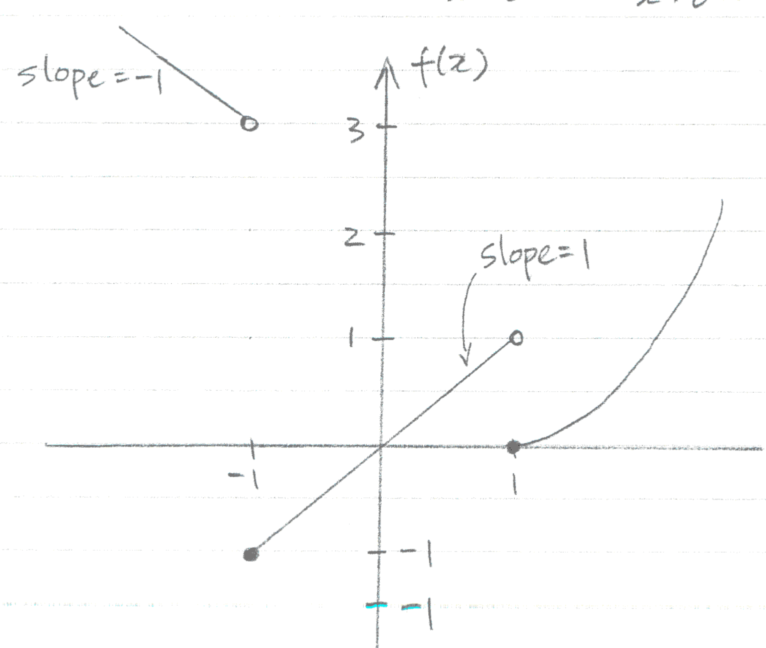
(i) $\lim_{x \to 4^+} g(x)$ does not exist, since the values of $g(x)$ oscillate infinitely between the values 1.5 and 2 as x approaches 4 from the right.

(j) $\lim_{x \to 4^-} g(x) = 2$

(k) $g(0)$ does not exist. (The function is undefined at $x=0$)

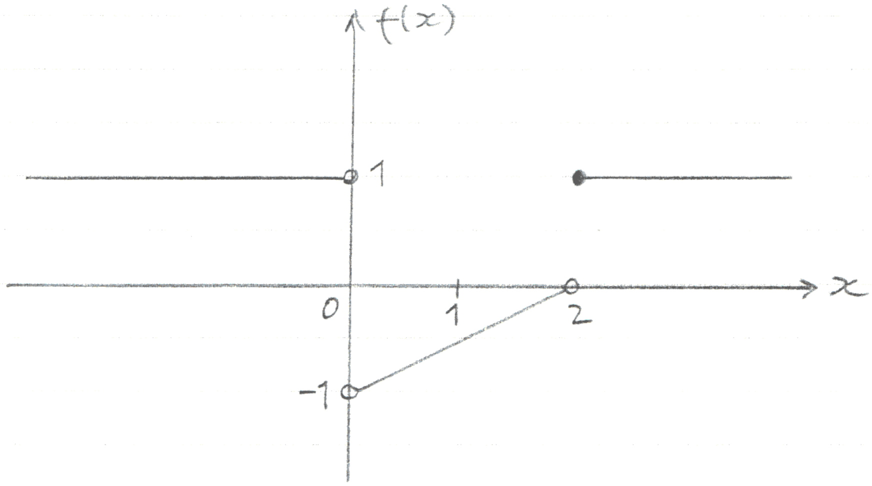
(l) $\lim_{x \to 0} g(x) = 0$. (Since $\lim_{x \to 0^-} g(x) = \lim_{x \to 0^+} g(x) = 0$)

12.



$\lim_{x \to a} f(x)$ exists for every real a, except for -1 and 1

14.



38. As $v \to c^-$, $v^2 \to (c^2)^-$

$$\Rightarrow \frac{v^2}{c^2} \to 1^-$$

$$\Rightarrow 1-\frac{v^2}{c^2} \to 0^+$$

$$\Rightarrow \sqrt{1-\frac{v^2}{c^2}} \to 0^+$$

$$\Rightarrow \frac{m_0}{\sqrt{1-\frac{v^2}{c^2}}} \to \infty$$

$$\Rightarrow m \to \infty$$

Section 2.4.

26. Let $\delta = \sqrt[3]{\varepsilon}$

$\therefore 0 < |x| < \delta \Rightarrow |x|^3 < \delta^3 = \varepsilon$

$\Rightarrow |x^3 - 0| < \varepsilon$.

$\therefore \lim_{x \to 0} x^3 = 0$.

30. $0 < |x-a| < \delta \Rightarrow |f(x) - L| < \varepsilon$

$0 < |x-3| < \delta \Rightarrow |x^2 + x - 4 - 8| < \varepsilon$

$\Rightarrow |x-3||x+4| < \varepsilon$.

$|x+4| < c \Rightarrow |x-3||x+4| < c|x-3|$

$c|x-3| < \varepsilon \Rightarrow |x-3| < \frac{\varepsilon}{c} = \delta$.

$\because |x-3| < 1$, $2 < x < 4$

$\Rightarrow 6 < x+4 < 8$.

$\Rightarrow c = 8$.

Let $\delta = \min\{1, \frac{\varepsilon}{8}\}$.

$|x^2 + x - 12| = |x+4||x-3| < 8 \cdot \frac{\varepsilon}{8} = \varepsilon$.