

Section 7.2

LEFT AND RIGHT-HANDED LIMITS

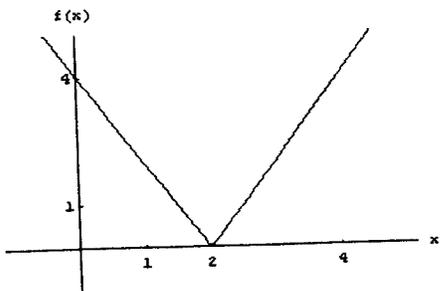
Problem 1.

- (a) $\lim_{W \rightarrow 1^-} f(W) = 0.32.$
- (b) $\lim_{W \rightarrow 1^+} f(W) = 0.55.$
- (c) $\lim_{W \rightarrow 1} f(W)$ does not exist.
- (d) $\lim_{W \rightarrow 1.5} f(W) = 0.55.$
- (e) $\lim_{W \rightarrow 2} f(W)$ does not exist.
- (f) $\lim_{W \rightarrow 12^+} f(W) = 12.$
- (g) $\lim_{W \rightarrow 12^-} f(W) = 12.$
- (h) $\lim_{W \rightarrow 12} f(W) = 12.$

Problem 5.

- $$f(x) = \begin{cases} 3x + 4 & \text{if } x < 0 \\ 2x + 4 & \text{if } x \leq 0 \end{cases}$$
- (a) $\lim_{x \rightarrow 1} f(x) = \lim_{x \rightarrow 1} (2x + 4) = 6$
 - (b) $\lim_{x \rightarrow -2} f(x) = \lim_{x \rightarrow -2} (3x + 4) = -2$
 - (c) $\lim_{x \rightarrow 0^+} f(x) = \lim_{x \rightarrow 0^+} (2x + 4) = 4$
 - (d) $\lim_{x \rightarrow 0^-} f(x) = \lim_{x \rightarrow 0^-} (3x + 4) = 4$
 - (e) $\lim_{x \rightarrow 0} f(x) = 4$

(a)



Problem 12.

$$f(x) = 2|x - 2| = \begin{cases} 2(x - 2) & , x \geq 2 \\ -2(x - 2) & , x < 2 \end{cases}$$

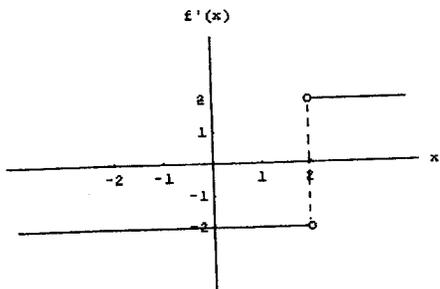
- (b) $f'(0) = \text{slope of } -2(x - 2) = -2$
- $f'(4) = \text{slope of } 2(x - 2) = 2$
- $f'(2) = DNE$ (corner)

$$(c) \lim_{h \rightarrow 0^+} \frac{f(2+h) - f(2)}{h} = \lim_{h \rightarrow 0^+} \frac{2|2+h-2| - 0}{h} = \lim_{h \rightarrow 0^+} \frac{2|h|}{h} = \lim_{h \rightarrow 0^+} \frac{2h}{h} = 2$$

$$\lim_{h \rightarrow 0^-} \frac{f(2+h) - f(2)}{h} = \lim_{h \rightarrow 0^-} \frac{2|2+h-2| - 0}{h} = \lim_{h \rightarrow 0^-} \frac{2|h|}{h} = \lim_{h \rightarrow 0^-} \frac{-2h}{h} = -2$$

Therefore $f'(2) = \lim_{h \rightarrow 0} \frac{f(2+h) - f(2)}{h} = DNE$

(d)



Section 8.2 : The First and Second Derivatives in Context

Problem 4.

- (a) The number of yen exchangeable for one dollar is increasing.
- (b) The number of yen exchangeable for one dollar is decreasing faster and faster.
- (c) On January 6, 1996, the number of yen exchangeable for one dollar is increasing at a rate of 0.8 yen/day.
- (d) This is the average rate of change of the exchange rate from January 4 to January 6, 1996.